MALE AND FEMALE, CYCLIST AND DRIVER PERCEPTIONS OF CRASH RISK IN CRITICAL ROAD SITUATIONS

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Abstract

In recent years, governments have embarked on a number of initiatives that have increased and continue to increase participation in cycling, encouraging a shift from individual car use to active transportation modes. Increasing participation in cycling is expected to bring about improvements in health and environment, as well as contributing to the creation of a more sustainable and resilient transport networks. However, many drivers and non-cyclists perceive cycling as an extremely risky activity, with women in particular concerned about the risk of injury. The low rates of cycling participation by women threatens to undermine the realisation of government targets for cycling participation as well as restricting the potential health benefits.

The aim of this research was to better understand the factors influencing perceived risk in cycling. The research asked study participants to consider situations in which a male or female cyclist or driver encounters another cyclist or driver, and one of the road users engaged in risky behaviour or carried out a traffic violation. In addition the research examined the influence on perceived risk in relation to type of vehicle being operated, type of interacting vehicle, characteristics of the situation, age, experience, perceived skill, past violations and degree of responsibility for the violation. Based on the findings of past research, it was hypothesised that perceived crash risk would be greater for females than males, for car drivers than cyclists, and when interacting with a car rather than with a bicycle. It was hypothesised that perceived crash risk would be lower with higher levels of experience, perceived skill, more frequent past violations and greater responsibility for the current situation.

The methodology used in an earlier French survey (Chaurand & Delhomme, 2013) was adapted to examine the perceptions of risk by male and female Australian cyclists and drivers. An online survey was conducted of regular cyclists (n=444) and (non-cyclist) car drivers (n=151). The participants rated the level of risk in six situations: Failing to yield; Going through a red light; Not signalling when turning; Swerving; Tailgating; and Not checking traffic. The survey also collected demographic and travel characteristics of participants and self-reported frequency of committing the abovementioned six risky behaviours.

This study found that female cyclists and drivers in Australia have higher levels of perceived risk than male cyclists and drivers for the interactions under

examination. The overall pattern of females perceiving higher levels of risk was not dependent on whether the female chose to cycle or to drive or whether the participant was responsible for the violation.

The results validated the hypothesis that car drivers would perceive higher crash risk than cyclists; however cyclists only perceived lower risk when the interacting vehicle was a bicycle. The general pattern of drivers reporting higher levels of risk than cyclists was absent for Failing to yield and Not signalling when turning. The hypothesis that the perceived level of risk would be higher when interacting with a car was not supported by the data, as there was no significant effect regardless of whether the interacting vehicle was a car or a bicycle. Fewer cyclists rated the risk of an accident as likely or very likely if they were responsible for the risky behaviour than if another driver was responsible in situations of Failing to yield, Going through a red light and Not signalling. However in relation to the results showed that the reverse pattern was true for Swerving and Tailgating.

A self-reported higher frequency of previously engaging in traffic violations was not associated with lower levels of perceived risk. Participants with higher levels of perceived Control, Overconfidence or greater experience, measured as age and time spent driving or cycling per week, recorded lower levels of perceived risk. Overall, females reported less frequent traffic rule violations. However in relation to Going through a red light and Swerving female drivers reported a higher frequency of non-compliance than male drivers. Male cyclists and drivers who recorded high levels of Overconfidence did not report engaging in more traffic violations. The self-reported frequency of engagement in traffic violations decreased with age and higher levels of Control. Higher rates of monthly use and higher levels of Incompetence (“distractibility” or “susceptibility to distraction”) were associated with higher frequency of self-reported traffic violations.

A comparison with the results of the earlier French study (Chaurand & Delhomme, 2013) found both French and Australian participants identified Tailgating as the most risky situation and Not signalling when turning as the least risky. French drivers and cyclists perceived lower levels of risk than Australian drivers and cyclists for all situations except Swerving. The effect of the type of interacting vehicle on the level of perceived risk was statistically significant for French participants but not for Australian participants. French and Australian drivers regarded most of the interactions with a bike as being less risky or similar levels of risk as Australian cyclists. French cyclists rated levels of risk significantly lower when the interacting vehicle was a bike. A gender difference was identified in both the French and Australian surveys. There was a consistent higher risk rating by females for all the six situations in both the French and Australian surveys. Cross cultural differences were also observed, French females rated the risks lower than Australian males in all situations except Swerving.

The current research has a number of implications for road safety. Previous Australian research found that females identified a lack of safety as a reason for not engaging in cycling as an activity (Garrard, Rose, & Kai, 2008; Sorensen & Mosslemi, 2009). Results from this study have identified that in Australia female road users perceive a higher level of risk within the transport environment than males for the same interactions. Thus while females repeatedly identify safety concerns, it may remain difficult for males to fully comprehend the level of safety required to encourage female participation in cycling. Street design, safety assessment and transport policy has been predominantly a male domain, developed with a male perspective of the acceptable level of safety. The design of transport infrastructure could consider greater female input and consultation to ensure that the road environment has a higher level of perceived safety. To achieve the desired government targets of cyclist participation, all members of the population need to feel safe on the road, so that implementation of safer cycling infrastructure would be beneficial to all members of the community, including females.

Future research could examine the risks perceived by cyclists and drivers that are associated with different types of road design. Identifying which forms of road design and cycling infrastructure have the greatest perceived safety for road users would enhance safety element s of the road environment. An observational study of the interactions considered in the current research could provide additional information on road user behaviour and involvement in regards to traffic violations.

Table of Contents

List of Tables

List of Figures

Statement of Original Authorship

The work contained in the thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, this thesis contains no material previously published or written by another person except where due reference is made. The current author was responsible for all of the data collection and analyses of the data. The ethical clearance number for this project was 1200000528 issued on the 12/10/2012.

QUT Verified Signature

Signature

Date 09.2.2015

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This thesis is dedicated to the memory of my mother Fay Griffin who instilled the importance of academic studies and recommended the pursuit of experience and achievement in life.

Chapter 1: **Introduction**

1.1 Background

A transport mode shift from individual car use to active transport, particularly cycling and walking, has been internationally identified and promoted as a method to resolve many of the transport, ecological, and health concerns of modern cities. Throughout the past decade there has been a significant return to cycling as a mode of transport and Australia has experienced a steady growth in cyclist participation. However, unlike a number of European and Asian countries where female participation is equal or higher than male, Australian women have not embraced cycling. In Australia female participation is approximately half that of males for recreational cycling and 20% for commuter cycling (Garrard, Crawford, & Hakman, 2006). The main barriers to cycling reported by females are safety issues with fear associated with verbal abuse or intentional harassment from motorists, injury resulting from a crash, and personal safety and lack of bike paths recorded as reasons for not cycling (Garrard, et al., 2006; Winters, Davidson, Kao, & Kay, 2010). If these safety issues were resolved by improving cycling facilities and driver education many females have identified they would take up cycling or cycle more than they currently do (National Heart Foundation, 2013a, 2013b).

An individual’s culture, race and gender have been observed to influence the degree of risk perceived when involved in different activities (Aven, 2010; Aven & Kristensen, 2005). Across a range of activities, females have been reported to be more risk sensitive, identify negative outcomes and not participate in risky activities and behaviours compared with males (Harris, Jenkins & Glaser, 2006). Males have been identified as overestimating their own capabilities and perceived control with more likelihood to participate in risky behaviour and commit offences (Félonneau et al., 2013). These factors may account for higher male participation numbers in what is considered an objectively high risk activity. A road user develops their perception of crash risk by evaluating the potential of an adverse event and the degree of personal control over the activity and possible outcome. Therefore, people who choose not to cycle may be more risk sensitive (Aven, 2010).

In Australia more males than females are involved in bicycle crashes (Australian Transport Safety Bureau, 2006; Henley & Harrison, 2011). The majority of cyclists injured (66%) or killed (85.6%) are male and this rate is consistent with male representation in all forms of land transport accidents (Henley & Harrison, 2011). However, the characteristics of crash involvement are different for cyclists and drivers. The major crash factors and characteristics resulting in driver injury or fatality involved risk taking behaviour; alcohol, not wearing a seatbelt, speeding fatigue and performing illegal manoeuvres resulted in an over representation of male involvement (79.6% of fatalities and 65.3% causalities in Queensland)(Transport and Main Roads, 2011). However, males are not more likely to experience a cycling crash or a serious cycling injury than females (Heesch, Garrard, & Sahlqvist, 2011; Washington, Haworth, & Schramm, 2012). Greater exposure and participation in high speed sporting activities by male cyclists are factors that result in higher representation of male cyclists injury and fatality rates.

Occurrences of cyclist injury or fatality are highly publicised and are combined with a negative portrayal of cyclists by the media as dangerous road users who disobey road rules (Rissel, Bonfiglioli, Emilsen, & Smith, 2010). Increasing the level of perceived crash risk associated with cycling has been linked with these negative media reports (Wahlberg & Sjoberg, 2000). Presently many drivers and non-cyclists perceive cycling as an extremely risky activity undertaken by risk takers (Gatersleben & Haddad, 2010; Schramm, Rakotonirainy, & Haworth 2010) with safety identified as a major barrier against participating in cycling (Garrard, et al., 2006; Haworth & Schramm, 2011; Sener, Naveen, & Bhat, 2009; Winters et al., 2012).

Any investigation of perceived risk needs to be undertaken in a framework that acknowledges the factors relevant to actual crash risk. Factors that have been identified as the cause of many cycling crashes include lack of attention, visual scanning or awareness, leading to a failure to detect one another (Räsänen & Summala, 1998a; Schramm, et al., 2010) with miscommunications and wrong expectations regarding intended actions between cyclists and drivers (Räsänen & Summala, 1998b). This suggests improved methods of communication between drivers and cyclists to communicate their intended movements needs to be developed to safely share the road. Cyclists and drivers need to understand the movement characteristics of each other in terms of speed, weight, road environment and potential hazards, manoeuvrability, distance vehicles require to stop and visibility (Räsänen & Summala, 1998a).

The research undertaken here utilises a methodology first reported by Chaurand and Delhomme (2013). They explored the perceptions of risk and the factors influencing these perceptions of cyclists and drivers in Paris. While the Australian study aims at investigating the influence of gender on cyclists' and drivers' perceptions of risk, the results from both surveys can be compared to observe differences and similarities between cyclists and drivers in both locations.

To comprehend how male and female cyclists and drivers perceive the risk to themselves and or to others when involved in interactions with other cyclists and drivers, this research will explore the influence of gender on an individual's level of perceived risk for a number of objectively high risk scenarios. This research will also compare male and female differences of perceived skill and control, self-reported participation in risky behaviours and travel behaviour. This information can be used to identify if people who choose to cycle or drive (and not cycle) perceive different levels of risk for the same interactions and how age, experience, perceived skill and control influence the level of perceived risk.

For Australian cities to successfully achieve a healthy community and environment as well as creating a more sustainable and resilient transport network, a continued increase in cycling participation is required. The high objective and perceived risk associated with cycling is deterring females in Australia from commencing or cycling more frequently. Information identifying how male and female cyclists and drivers perceive risk when interacting with other road users can help guide road safety strategies and cycling policy to create a safer cycling environment.

1.2 Demarcation of scope

This research will investigate how cyclists and drivers perceive the risk to themselves and or to others when interacting in a number of traffic scenarios. All of the scenarios are likely to occur in an urban environment on relatively high-volume and low speed roads. As such, there is limited relevance for issues of rural cycling. The research focuses on adult bicycle riders because it is known that patterns of riding and risk perception of children differ from adults (Greening, Stoppelbein, Chandler, & Elkin, 2005; Haworth & Debnath, 2013), and children and teenagers are usually less experienced (Lajunen & Räsänen, 2001). The scope of motor vehicle operators is limited to car drivers in this study, although it is acknowledged that heavy vehicles are disproportionately involved in cyclist fatalities (Australian Transport Safety Bureau, 2006).

The focus of the research is on measuring perceptions of risk rather than objective risk or objective measures of behaviour. Calculating objective risk rates of fatality and injury for cyclists in Australia is limited due to the complexity and range of agencies involved in data collection. Data for injury and fatality rates in Australia per kilometre are unavailable (Haworth, Schramm, King, & Steinhardt, 2010). Hospital data depends on the individual collecting the data and may not include injured cyclists who are not admitted to hospital or include cyclists (often children) who are admitted only for observation (Haworth, et al., 2010). It is acknowledged that off-road crashes and crashes not resulting in serious injury for the cyclist are often not reported to police and therefore not included in the data.

This research has restricted the recruitment of participants to those who have a drivers licence. These participants are likely to have more road user experience and are more likely to have experienced the risky situations explored in the survey.

The review of the literature on cycling safety and perceptions of risk generally focused on research from developed countries. There are significant differences between Australia and developing countries in relation to crash rates and characteristics, socioeconomic circumstances, legislation, and levels of use and motivations for use. These impact the relevance and applicability of research from developing countries to this study.

1.3 Outline of thesis

Chapter 2 provides a comprehensive review of current literature on the scale and nature of safety issues for male and female cyclists and drivers to identify factors and behaviours that contribute to objective and subjective crash risk and the propensity to engage in risky behaviours and traffic violations. The literature review covers research into differences observed between male and female risk perception; the scale and nature of injury and crashes experienced by cyclists in Australia; and research into trends and safety issues for male and female cyclists. The literature review provides the foundation for the development of a series of research questions that are examined through an on line survey of cyclists and drivers. The chapter then describes the research aims, research questions and research hypotheses.

Chapter 3 details the research methodology including the recruitment of participants, the questionnaire, research questions and the research design. The chapter describes the management of data and the results from exploratory relationships between variables.

Chapter 4 presents the results from analysis of the survey, commencing with the demographic characteristics of participants followed by their travel behaviour characteristics, self-reported crash and violation history. Analyses of the variables' measured effects on the levels of perceived risk recorded by the participants for each situation are then presented.

Chapter 5 provides a discussion relating the research results with the study hypotheses, reviewed literature and the differences and similarities found between the Australian and French survey results. The chapter concludes by discussing the significance of the results for road safety strategies in Australia.

1.4 Summary

This first chapter has outlined the rationale and scope of the current program of research, based on the review of literature, which identified gaps in knowledge regarding the perception of risk by cyclists and drivers when they interact with other cyclists and drivers in a range of risky situations. An outline of the research aims, research design, specific studies undertaken, and thesis structure in terms of chapter content was provided.

Chapter 2: **Literature Review**

2.1 Introduction

The safe integration of large cyclist numbers into the transport system requires road users to modify their expectations regarding the type of interaction and potential risks that may occur while travelling in shared road space. An individual's travel behaviour and level of perceived crash risk is developed by a wide range of factors such as experience, their mode of travel (bicycle or car), interacting vehicles and road environment. All factors affect a road user's perception of risk for different situations and interactions. Some research proposes that gender is an intrinsic part of human nature affecting an individual's behaviour and perception of risk and therefore dividing research data into male and female will be more informative (Gilligan, 1982). In Australia, there is a disparity in cycling participation between males and females that is not seen in a number of other cultures (Garrard, et al., 2006). The information gained from examining male and female cyclist and driver risk perception can provide a valuable insight into road user behaviours.

Road deaths and injury have a major social impact on the community and families with an economic cost in Australia estimated at 27 billion dollars per year (Department of Infrastructure and Regional Development, 2013). In Australia over the past 10 years there has been a decrease in the number of road crash fatalities for both males and females across all modes of transport per population (Bureau of InfrastructureTransport and Regional Economics, 2013a). Tragically 2013 did not follow this trend for cyclists with 43 killed in road crashes in the 12 months to October 2013 (Bureau of Infrastructure Transport and Regional Economics, 2013b). This was a 20.9% increase from the previous 12 months and the highest number of cyclist fatalities since 2004 (Bureau of InfrastructureTransport and Regional Economics, 2010b; 2013). Both drivers and cyclists have been deemed at fault for the actions that have led to fatal and serious injuries to cyclists (Australian Transport Safety Bureau, 2006). Risk-taking behaviour, involvement in traffic violations, miscommunication between road users and lack of attention have been recorded as behaviours that contribute to involvement in crashes (DeJoy, 1990; Räsänen & Summala, 1998a; Schramm, et al., 2010). Research shows males are involved in more traffic crash fatalities, receive more injuries and have a higher likelihood of participating in risk-taking behaviour (DeJoy, 1990; Henley & Harrison, 2012; Norton, Henley, & Harrison, 2010). This literature review will examine current research on gender differences in perceived risk, risk-taking behaviour, travel behaviour and crash involvement of cyclists and drivers.

2.2 Perceived Risk

Perceived risk or subjective risk relates to the level of risk (worry or anxiety) perceived or felt by an individual about an activity (Aven, 2010). An individual develops their perception of risk by evaluating a number of factors, including the likelihood of an adverse event, the degree of personal control over the activity and possible outcomes (Aven, 2010; Sorensen & Mosslemi, 2009). Concurrently, the individual is influenced by a complexity of human factors, such as prior knowledge and experience, social judgments of trust, blame and responsibility, cultural groups of victims, the historical context of the hazard and gender (Aven & Kristensen, 2005).

2.2.1 Gender differences in perceived risk

Quantitative surveys of risk perception have shown consistent gender differences in the results (Byrnes, Miller, & Schafer, 1999; Gustafson, 1998). Males and females have a propensity to perceive risk in the same events, but females systematically record higher levels of perceived risk (Gustafson, 1998).

Explanations as to why females perceive higher levels of risk vary. Some writers claim that females are more risk aware because they have an ‘ethic of care’, a maternal tie between relationship and responsibility (Gilligan, 1982). Rather than one neutral gender, Gilligan (1982) proposes that research should consider male and female psychological, social and cultural experiences as two modes (male and female); historically there has been a male bias. Considering differences between the genders will result in a balanced perspective that makes it possible to arrive at a more complex rendition of human experience (Gilligan, 1982).

Another perspective considers that masculinity and femininity are social and cultural constructions (Henwood, Parkhill, & Pidgeon, 2008). It states that masculinity and femininity have been formed by socio-political practices and historical circumstances and that these social roles operate as a regulatory system or norms of discourse (Wetherell, 1996). According to this model, the effect of gender may vary across nationalities. Therefore gender differences in perceived risk will be influenced by the location of the research and will reflect social roles and learning of both genders within the culture. Consistent with this approach, other writers suggest that gender differences in perceived risk do not exist for a number of communities (Kalof, Dietz, & Guagnano, 2002). An American study on environmental issues (Kalof, et al., 2002) identified gender differences in perceived risk in white participants, but no gender effect with native American, African and Hispanic cultures (Kalof, et al., 2002). Although this study was investigating perceived risk in environmental issues, their results may be pertinent if one considers that concern for the environment is one of the motivators for changing from car use to bicycles.

Research is yet to investigate gender differences in perceived risk for Australian males and females and the extent to which gender differences in risk perception might contribute to the observed gender disparities in cycling participation. In addition, Henwood et al. (2008) propose that gender be examined not only as a variable per se, but as a method to further look into what the results might mean regarding the social learning and psychology of the community, and will provide a more in-depth understanding of the subject under investigation (Henwood, et al., 2008).

2.2.2 Risk in transport

The risk perceived by an individual road user influences their behaviour, choice of transport and the danger they view in the road environment. Many people overestimate or underestimate the level of risk associated with driving or cycling (Lupton, 1999). Thus individuals who perceive low levels of risk associated with traffic and transport may engage in objectively risk-taking behaviour and traffic law violations because they do not perceive the activity as risky. Individuals who perceive high risk may adopt unexpected behaviours for interactions that they perceive as dangerous but which may not be objectively risky.

For many individuals their level of perceived risk associated with cycling or driving influences their choice of transport. Drivers perceive less risk when in a car because there is the impression of being in a "safe cocoon" even when they are at objective risk (Chaurand & Delhomme, 2013). Conversely, it can be assumed that cyclists have rationalised that cycling is not that risky, because they choose to ride, despite it often being considered dangerous and risky in our cities (Chaurand & Delhomme, 2013). The lack of safety or perception of high levels of risk associated with cycling has been identified as a major barrier to cycling by drivers and non-cyclists (Garrard, et al., 2006; Haworth & Schramm, 2011; Sener, et al., 2009; Winters, et al., 2012). An Australian review of literature examining the role fear plays in influencing the rate of commuter bicycling asserted that in Australia the level of fear associated with riding a bike on road is disproportionately higher than the fear associated with car travel (Fishman, Washington, & Haworth, 2012). That people base their understanding of cycling safety by what they "feel" rather than the quantitative risks associated with various transport modes (Fishman, et al., 2012). Fishman, et al., (2012) suggest the fear associated with cycling is also linked to near collisions which are far more frequent than crashes, not only for the cyclists involved but importantly for the driver and passengers. That near collisions increase their sense or perception of the "vulnerability of cyclists" (Fishman, et al., 2012) and this perception of vulnerability is an emotional barrier to commencing or participation in cycling as an activity (Fishman, et al., 2012). Fishman, et al., (2012) suggest to increase participation in Australia cycling will require the development of a road environment that is not only safe but "feels" safe to overcome the emotional barrier to cycling.

An exaggeration of the level of fear (probabilities) of injury and death associated with cycling has also been observed in the United Kingdom (Horton, Rosen, & Cox, 2008). Horton (2008) suggests that contrary to intentions safety education campaigns, helmet promotion and the increasing separation of cycling from motorised traffic has resulted in increased levels of perceived risk associated with cycling. That culturally it has been constructed that cyclists and pedestrians must be afraid and take care, rather than increasing the sense of responsibility for the car driver or imposing other road danger restrictions for example reducing the speed of cars (Horton, et al., 2008). Historically following the increasing availability of motor vehicles cycling was further marginalised by government policy; prioritising motor vehicles with the over-allocation of road space (Horton, et al., 2008). In recent years there has been a major promotion of cycling resulting in the construction of separate cycling infrastructure and redistribution of roads for the inclusion of cycle lanes. Horton, et al (2008) warns that the emerging off road and cycle lanes may have an unintended consequence of reinforcing the concept that cycling is only safe in these environments and is not safe on normal roads. Horton (2008) suggests that fear associated with cycling is inevitable because safety campaigns, helmet laws and media reporting accentuate the danger associated with cycling promotion. That it is important to stop communicating the danger and promote a pro-cycling culture that affirms cycling as ordinary and enjoyable practice (Horton, et al., 2008).

Cross cultural differences in risk perception have been examined by research covering issues such as disasters, finance, environmental issues and transport. The level of risk perceived by individuals varies between countries because the differences in the cultural norms and beliefs, information shared by government and media, wealth and population and the transport environment has an influence (Gierlach, Belsher, & Beutler, 2010; Lund & Rundmo, 2009; Sjoberg, Moen, & Rundmo, 2004). A cross cultural study comparing Chinese and Australian participants found Chinese participants had significantly lower perceptions of risk for cycling but slightly higher levels of perceived risk for driving than Australian participants (Rohrmann & Chen, 1999). Differences in risk perception for traffic accidents were found between Japanese and American drivers regarding severity with Japanese drivers perceiving greater levels of risk and responsibility (Hayakawa, Fishbeck, & Fischoff, 2000). A comparison study of drivers in Norway and Ghana found major differences on risk perception between the countries (Lund & Rundmo, 2009). Ghanaians perceived a greater probability of involvement and severity of traffic crashes, possibly because Ghanaians were more exposed to various hazards and therefore may be more sensitive to risk (Lund & Rundmo, 2009). Age was a significant factor with adolescents being more likely to take risks in traffic in both Norway and Ghana (Lund & Rundmo, 2009). However, there was an effect of gender found only for Norway, where males perceived lower risks compared to females with no gender effect found for Ghana (Lund & Rundmo, 2009).

Therefore, the level of risk perceived will reflect the culture, beliefs, environment and gender of the individuals being examined. That perceived lack of safety is associated with cycling is evident in Australia, further research can examine what are the differences, if any, between males and females, and cyclists and drivers.

2.3 Gender issues in cycling

While some areas of Australia have experienced a steady growth in cyclist participation throughout the past decade, cycling has not been embraced by the female population. A recent survey of Australian women found 30.2% had cycled in the past six months with 74% cycling for recreation and 26% for transport (National Heart Foundation, 2013b). This survey found 3.7% of total respondents rode for transport and 8.7% for recreation once a week or more frequently (National Heart Foundation, 2013b). A gender disparity of participation rates has been found in all locations throughout Australia (Garrard, et al., 2008; Office of Economic and Statistical Research, 2010). The rate of participation in recreational cycling for females is approximately half that of males and even lower for commuter cycling (Department of Transport and Main Roads, 2011). A Melbourne study observed a ratio of 1 female to 4 males for commuter cycling (Garrard, et al., 2008). This difference between male and female participation rates in Australia does not follow the trends observed in a number of Asian and European countries, where there are female participation rates that are equal or higher than male (Garrard, et al., 2006; Pucher & Buehler, 2008). While studies into gender differences in commuter cycling in Australia have identified barriers and constraints; personal safety, traffic risks and family responsibilities, that influence females against cycling. They do not explain why these same factors are not constraints in some other countries with high female participation (Garrard, Handy, & Dill, 2012). Studies have identified that injury risk for female cyclists are not objectively higher than for males (Heesch, Garrard, et al., 2011; Washington, et al., 2012). Therefore, the difference between male and female cycling participation rates in Australia suggests a difference between male and female risk perception (the risk to themselves and or to others) when interacting in the transport environment and this factor is influencing vehicle choice.

2.3.1 Male and female cyclist behaviour

It has been argued that the lack of a cycling friendly environment and culture may underlie the gender difference in cycling participation in Australia (Garrard, et al., 2006). Garrard, et al., (2006) recommended that creating a cycling friendly environment would benefit not only females but the entire population. A Queensland study of gender differences in cycling patterns found the motivations for both males and females who cycled for recreation were personal factors, such as improving health and fitness, reducing stress and enjoyment (Heesch, Sahlqvist, & Garrard, 2012). Convenience, cost and environmental concerns motivated both males and females who regularly commuter cycle, males spent longer periods of time travelling than females, however both males and females made the same number of trips per week (Heesch, et al., 2012). This study showed that both male and female cyclists were an active subgroup when compared with the general Australian population who succeeded in achieving the guidelines for physical activity (Heesch, et al., 2012). Despite evidence that the health and economic benefits outweigh risks many drivers and non-cyclists perceive cycling in the present road environment as an extremely risky activity (Garrard, et al., 2006; Gatersleben & Haddad, 2010; Schramm, et al., 2010).

Both male and female recreation and commuter cyclists in this Queensland study reported using a combination of routes and both male and female cyclists identified the preference for cycle paths separate from traffic and pedestrians (Heesch, et al., 2012). This is consistent with other Australian and international studies that found women rode less on busier streets and more on bike lanes and bicycle boulevards (Haworth & Schramm, 2011; Sorensen & Mosslemi, 2009). Studies on cycling participation have reported that the lack of cycling lanes and paths is a constraint or barrier preventing female non- cyclists from commencing cycling (Garrard, et al., 2008; Heesch, et al., 2012). Australian research observed a gender effect in the approach to recreational cycling with women engaging in cycling as a more ‘leisure’ oriented activity preferring recreational cycling on off-road paths with family and social interaction, whereas men prefer more ‘fitness’ oriented cycling on the road (Garrard, et al., 2006). A South Australian study of cycling throughout the life time of women participation, found that women viewed cycling as part of their health and lifestyle practice rather than a form of mobility (Bonham & Wilson, 2012). That the decision to cycle was influenced by different periods of their life and life events such as having children created issues such as the unavailability of appropriate equipment and facilities (Bonham & Wilson, 2012). .

The value of infrastructure in promoting a change from car use to cycling is illustrated by European countries such as Germany, Denmark and the Netherlands which implemented major cycling infrastructure, resulting in increased cycling participation rates and a significant reduction in cyclist injuries and fatalities (Pucher & Buehler, 2008). Before-and-after studies in Portland and Denmark that recorded cyclist and motorist behaviours showed that the installation of intersection cycling infrastructure led to a change in road user behaviour with motorists slowing and increasing their visual awareness (Hunter, Harkey, Stewart, & Birk, 2000; Jensen, 2008). A review of 23 papers found that the installation of cycling infrastructure significantly reduces crash and injury rates, and has a positive influence on the behaviour of road users (Reynolds, Harris, Teschke, & Cripton, 2009). However, infrastructure does not remove the need for cyclists to commence, cross or finish their journeys on shared roads. Some research cautions that separated cycle paths could result in an increase of crashes at intersections, because of a lack of attention due to the physical separation of cyclist and motor traffic (Elvik, 2009; Elvik, Vaa, & Erke, 2009; Schepers, Kroeze, Sweers, & Wüst, 2011). A thorough review of the extensive literature in these areas is beyond the scope of this thesis, but the interested reader is referred to Pucher, Dill & Handy (2010) and Elvik, Vaa & Erke (2009) for summaries of the literature in these areas.

2.3.2 Male and female crash involvement

Females are involved in fewer traffic crashes and young drivers and males drivers are over-represented among those involved in traffic crashes in almost all countries (Henley & Harrison, 2012; Laapotti, 2004). In 2008-09 males accounted for 67% of serious injury cases resulting from road vehicle traffic crashes in Australia (Henley & Harrison, 2011). Greater exposure measured as kilometres travelled and trip frequency, does contribute to a higher crash involvement by males (Laapotti, 2004; Ozkan & Lajunen, 2006), but it does not account for the even higher representation in serious injury and fatal car crashes (Laapotti, 2004; Mayhew, Ferguson, Desmond, & Simpson, 2003). In Queensland between January 2006 and December 2010, 79.6% of all crash fatalities and 65.3% of people hospitalised following a crash were male (Transport and Main Roads, 2011). In the Queensland crash statistics, risk taking behaviours were a major factor of crash characteristics reported (Transport and Main Roads, 2011). The high percentage of male fatalities and injuries for crash characteristics involving speed (92.5%, 83.7% respectively), fatigue (81.8%, 74.2%), not wearing a seat belt (81.2%, 62.6%), illegal manoeuvres (74.5%, 64.4%) and driving when intoxicated (89.0%, 81.3%) reflect the propensity for involvement in risk taking behaviour by males (Transport and Main Roads, 2011).

Males comprise 85.6% of cyclists killed in Australia (1991-2009), and until recently 15-29 year olds were the age group most commonly involved (Australian Transport Safety Bureau, 2006). There has been a noticeable increase in the proportion of fatalities for cyclists aged 25 years or older (Australian Transport Safety Bureau, 2006) that is consistent with the increase in popularity of older males cycling for health (Haworth et al. 2010). Injury statistics also reflect the increasing cyclist participation of older age groups through a significant increase in the age standardised rates of hospitalisations among those aged 45-64 years, of both genders (Norton, et al., 2010).

In Australia, male cyclists comprise 18% of all males seriously injured in road crashes; the corresponding figure for females is only 9% (Henley & Harrison, 2012). Males accounted for 80.3% (4,224) of seriously injured and 85.3% (783) of high threat to life cyclist hospital admissions (2008/09) (Henley & Harrison, 2012). In contrast to the general road safety research, cycling studies have found no association between cycling crash rates and gender. Males are not significantly more likely than females to have a cycling injury or a serious cycling injury per kilometre ridden (Heesch, Sahlqvist, & Garrard, 2011; Washington, et al., 2012). The increased numbers of injuries and gender differences in crash and injury involvement for cyclists can be explained by accounting for demographic differences in exposure, riding time and frequency between males and female cyclists.

2.4 Factors affecting perceived risk in cycling

A new range of road user interactions and crash risk variables is associated with the presence of large numbers of cyclists on roads and drivers are required to adapt their behaviour. This new distribution of road uses requires a change in the understanding of how road space is shared; road users need to be aware of how different modes of transport move in terms of speed, visibility and manoeuvrability and anticipate possible risk sources. A crash with a motor vehicle has the highest risk of injury or fatality for a cyclist, with shared road spaces internationally identified as the transport environment where most cyclists are injured or killed (De Rome, Boufous, Senserrick, Richardson, & Ivers, 2011; Räsänen & Summala, 1998a; Watson & Cameron, 2006; Winters, et al., 2010). In Australia, cyclists have constituted between 2-3% of all road user fatalities (2003-2012) with 85% of cyclist fatalities following a collision with a motor vehicle (1991 to 2005) (Australian

Transport Safety Bureau, 2006). The seriousness of a crash between a cyclist and a motor vehicle underlines the importance of a study examining behavioural and underlying cognitive variables of both cyclists and drivers when interacting with each other.

One considered approach to the variability of cyclist and driver perceived crash risk was “A comparative study of cyclists and drivers perceived risk” conducted in Paris by Dr Nadine Chaurand and Professor Patricia Delhomme in 2013 with the aim of identifying predictors of perceived risk for cyclists. Chaurand and Delhomme (2013) explored the risk perceived by experienced French cyclists and drivers when a number of risky behaviours were executed by another cyclist or driver. The research measured perceived risk as the likelihood that a participant thought they might be involved in a crash if they found themselves in one of six high risk situations: Failing to yield; Going through a red light; Not signalling when turning; Swerving into the opposing lane; Tailgating; and Not checking traffic. This study revealed that both cyclists and drivers perceived the same car-bike / bike-car (a driver interacting with a cyclist doing a traffic violation, compared with a cyclist interacting with a driver doing the same traffic violation) interactions differently (Chaurand & Delhomme, 2013). The results found that drivers perceived higher levels of risk than cyclists for all situations except Not signalling when turning and Swerving (Chaurand & Delhomme, 2013). Both drivers and cyclists perceived greater risk when interacting with a car than with a bike; however, cyclists interacting with a car perceived significantly more risk than drivers when interacting with a bike (Chaurand & Delhomme, 2013).

Chaurand and Delhomme (2013) proposed that considering the physical consequences of car–bike crashes can be equivalent or worse than car–car crashes, road users should perceive similar levels of risk for both. That the difference found between drivers’ and cyclists’ level of perceived risk for interactions with a car and a bike in their study may indicate that “cyclists underestimate their risk or drivers overestimate theirs” (Chaurand & Delhomme, 2013, p. 1181). Drivers who perceived less risk when interacting with a bicycle than with a car could signify they may not take the same attention and care when interacting with a bicycle as with a car (Chaurand & Delhomme, 2013). While this study found that both drivers and cyclists perceived Tailgating as the most risky situation and Not signalling when turning being the least risky, there was a discrepancy between the levels of risk reported by cyclists and drivers for each situation where cyclists on average perceived less risk than drivers (Chaurand & Delhomme, 2013). Their results also highlight that perceived crash risk was dependent on both the mode of transport used by the participant and whether they were interacting with another cyclist or driver. Different levels of perceived risk were recorded for different interaction types; car–car, car–bike and bike–bike which could be a source of road safety problems (Chaurand & Delhomme, 2013).

2.4.1 Perception of Skill and risk perception

The level of experience and perceived skill of an individual has been identified as influencing the level of perceived risk of cyclists and drivers (Chaurand & Delhomme, 2013; Ozkan & Lajunen, 2006). An individual develops their perception of skill by evaluating their own capabilities and control over the vehicle and the environment through which they travel. The level of skill perceived by an individual will affect their level of perceived risk and thus behaviour, in research drivers have rated their own level of skill as better than the average drivers' skill (McKenna, Stanier, & Lewis, 1990). It was proposed that people may have a 'positive-self' bias or optimism, where an individual perceives their skill will result in less likelihood of being involved in a crash than another person's (DeJoy, 1990; McKenna, et al., 1990). The French driver and cyclist comparison study found perceived skill was correlated with the level of risk identified by participants (Chaurand & Delhomme, 2013). Higher levels of perceived skill, measured as control and overconfidence were associated with lower levels of perceived risk and in contrast, higher levels of perceived incompetence were associated with higher levels of perceived risk (Chaurand & Delhomme, 2013).

There has been observed a significant difference between male and female self evaluation of perceived skill. Male drivers have a tendency to rate themselves as having a higher perception of skill and sense of optimism than female drivers (DeJoy, 1990; McKenna, et al., 1990; Ozkan & Lajunen, 2006). De Joy (1990) found that young males had an exaggerated sense of their own driving abilities and for a number of dangerous driving behaviours males perceived less risk then their female counterparts. Male participants in this research also presented a optimistically biased estimate of their accident likelihood and considered themselves to be safer than other road users (DeJoy, 1990). This research found that both males and females held similar concerns for the driving environment and likely hood of being caught while engaging in risky behaviours, there was however, a clear gender difference in the seriousness and degree of risk associated with risky actions (DeJoy, 1990).

Other research has identified that females are more risk sensitive, identify negative outcomes and are less likely to participate in risky activities (Byrnes, et al., 1999; Harris, Jenkins, & Glaser, 2006). Despite these studies that identify gender differences in risk perception other studies of young drivers have found no correlation between gender and crash involvement or concerns regarding the driving environment (DeJoy, 1990; Ozkan & Lajunen, 2006). In a French study of cyclists both male and female cyclists reported a positive bias when comparing their abilities with others (Félonneau, et al., 2013). However, male cyclists estimated themselves as more competent than female cyclists while female cyclists rated themselves as more cautious (Félonneau, et al., 2013).

2.4.2 Cyclist experience, route choice and risk perception

The amount of experience an individual has with their mode of transport may influence their level of perceived risk. People who choose to cycle may consider cycling and interactions with cyclists less risky than drivers who do not or infrequently cycle. High traffic volume routes that have a higher objective crash risk may be chosen by experienced cyclists, because through experience they have developed a lower perception of crash risk for high volume road conditions. Based on their greater experience regarding how a cyclist moves through the road space and traffic, an experienced cyclist may feel more in control and capable of avoiding negative events (Chaurand & Delhomme, 2013; Lupton, 1999). In an American cycling study the experience and the individual personality of the cyclist resulted in a substantial diversity of responses to traffic volume (Sener, et al., 2009). The results found a number of cyclists preferred to ride with vehicles travelling at a moderate speed in preference to slow moving off road cycling paths (Sener, et al., 2009). Other studies have shown commuter cyclists diverge very little from the shortest path, preferring direct route bicycle lanes on existing streets over indirect off-street bicycle trails and most use major road routes (Aultman-Hall, Hall, & Baetz, 1997; Krizek, 2006). A French study identified competitive road cyclists who were frequently riding on fast roads and experiencing exposure to high traffic danger, assessed their own vulnerability in crash situations as lower than average cyclists (Martha & Delhomme, 2009). However, the comparison study of French cyclists and drivers found no significant effect between the amount of experience, when measured in weekly distance and time spent travelling and the level of perceived risk (Chaurand & Delhomme, 2013). Therefore, through experience cyclists may evaluate lower or objective perceptions of risk associated with cyclist interactions than people who do not cycle, or travel time and direct routes may be considered more important than crash risk.

2.4.3 Risk-taking behaviour and traffic violations

Lower levels of perceived crash risk have been linked to the increased engagement in risk-taking behaviour with risky behaviour associated with increased crash involvement and severity (DeJoy, 1990). Both cyclists and drivers have been deemed at fault for crashes resulting in serious injury or fatality (Bíl, Bílová, & Müller, 2010) and failed to observe road sign or signal was the cause of 6.4% Australian cyclists fatalities (Australian Transport Safety Bureau, 2006).

Passive safety improvements to cars (seatbelts and air bags) increase the drivers' perception of security, resulting in lowering the level of perceived risk and a propensity to adopt risky behaviours. Drivers lower risk perception may increase the risk to vulnerable road users (Garrard, Greaves, & Ellison, 2010). Drivers were at fault in 65.6% of police-reported bike-car crashes in Queensland (2000-2008) with the driver being involved in a traffic violation recorded for 85.4% of these crashes (Schramm, et al., 2010). Police reports identified undue care and attention accounted for 22.4% of crashes (disobey a give way sign 19.1%, fail to give way 15.3%, turn in the face of oncoming traffic 11.9%, and open a car door causing danger 5.9%) (Schramm, et al., 2010). However, the crash report did not identify whether these behaviours were the result of inattention, poor judgment identifying the movement of the cyclist or a more aggressive intent (Schramm, et al., 2010). Conversely the contributing factors when cyclists were at fault were more often rider conditions inattention (34.7%) and inexperience (26.5%) than traffic violations, with younger (under16 years, 29.9%) and elderly cyclists more likely to be at fault (Schramm, et al., 2010). Cyclists executing a traffic violation caused 28.1% of cyclist at fault crashes (34.4%), disobey a traffic light 6.4%, fail to keep left 5.1%, and fail to give way 4.7% (Schramm, et al., 2010).

Chaurand and Delhomme (2013) found that cyclists and drivers perceived a traffic violation as less risky if they were the one responsible for committing the violation. When the road user perceived they were in control of the situation, they would be more capable of preventing a crash, and if they committed a traffic violation, they must have evaluated that it was safe to do so (Chaurand & Delhomme, 2013). The research found no significant effect between frequency of self-reported traffic violations and perceived risk for cyclists; for drivers there was a statistical significance for Failing to yield and Not signalling when turning, where the more violations drivers reported committing the higher level of risk they perceived (Chaurand & Delhomme, 2013).

Males overestimating their own capabilities and perceived control has been associated with having a higher likelihood of engaging in traffic violations (DeJoy, 1990). Male road users' greater propensity of engaging in risky behaviours and sensation seeking has been identified as a major crash cause (Jonah, 1997; Kim, 2000; Oltedal & Rundmo, 2006). Females were found to have more positive attitudes towards traffic laws and committed fewer violations (Laapotti, 2004). The higher number of male drivers critically injured or killed in car crashes has been linked to participation in highly risky behaviours such as road rule violation, speeding, driving when intoxicated, driving at night time and not wearing a seatbelt (Kim, 2000).

Speed is a factor in many crashes between bikes and cars, and between 1996-2004 the majority of cyclist deaths (48%) occurred on highways or arterial roads (Australian Transport Safety Bureau, 2006). In urban areas many fatalities and serious injury crashes occur on mid-block or straight roadway because the increased speed of the motor vehicle results in a higher impact and therefore more serious outcomes for the cyclist (Australian Transport Safety Bureau, 2006; Bíl, et al., 2010). A Sydney study of 133 drivers using a Global Positioning System to monitor their driving behaviour for several weeks found 19% of the distance driven was over the speed limit (Greaves & Ellison, 2011). This research found that speeding was most prevalent on motorways and on lower speed residential streets with the majority of drivers exhibiting marginal speeding behaviours (Greaves & Ellison, 2011). The research noted that there was a small but important minority who were frequently driving over the speed limit by excessive amounts (Greaves & Ellison, 2011). A self-reported study of the speeding behaviour of Australian drivers found there was no significant gender difference for speeding behaviour in 60km/h zones; however in 100 km/h zones males reported significantly faster speeding behaviour (Fleiter & Watson, 2006). This study found it was almost socially acceptable behaviour to exceed the speed limit with an expected tolerance of 10% despite the associated risk (Fleiter & Watson, 2006).

The acceptance of Australian drivers of exceeding speed limits suggests they consistently travel over the 50km/h limit in residential zones (Fleiter & Watson, 2006; Greaves & Ellison, 2011) and a further reduction of traffic speed for local streets would reduce the severity of cyclist crashes. Reducing traffic speed to 30km/h in residential areas has been shown to be an effective strategy to reduce road traffic casualties in London and many European cities (Grundy, 2009; Pucher & Buehler, 2008). While reduced speed is effective in residential areas, it does not influence the outcome or number of crashes that occur on larger and rural roads with faster speeds.

2.5 Cyclist and driver perceptions and expectations

The significant return to cycling as a mode of transport following a period of motor vehicle domination has changed the road user interactions that drivers encounter. This renewed presence of cyclists on the road has required an adjustment by road users to a new distribution and sharing of road space. Both cyclists and drivers need to increase the awareness of the presence of cyclists and learn how to communicate their intended actions as inattention, incorrect expectations and miscommunication have been recorded as major causes of crashes (Bíl, et al., 2010; Räsänen & Summala, 1998b).

2.5.1 Miscommunication between road users

Misjudgement of action by cyclist or driver was the cause of 9.5% of fatal cyclist crashes in Australia between 1991 and 2005 (Australian Transport Safety Bureau, 2006). Miscommunication, wrong expectations, confusion and problems communicating intended movements between the travellers has been identified as a cause of crashes between cars and bicycles (Räsänen & Summala, 1998a). Other research has shown drivers were unaware of the relevant road rules (Rissel, Campbell, Ashley, & Jackson, 2002), leading to crashes caused by drivers failing to obey the road rules. Frequently in these studies crashes occurred when the cyclist expected and had assumed that the driver would give way as required by law (Räsänen & Summala, 1998a).

2.5.2 *Inattention and lack of awareness*

The lack of attention or awareness, leading to a failure to detect one another, has been identified as a primary cause of collisions between motorists and cyclists (Räsänen & Summala, 1998a; Schramm, et al., 2010). In one third of fatal cyclist crashes in Australia the cyclist or driver failed to observe each other (Australian Transport Safety Bureau, 2006). In one study 37% of the 188 bicycle-car crashes neither the driver nor the cyclist was aware of the danger or had time to react (Räsänen & Summala, 1998b). The report suggests that it is the improper allocation of attention to visual scanning in particular where the driver is turning and passes across the path of the cyclist that may lead to the driver not seeing the cyclist (Räsänen & Summala, 1998a).

A Melbourne study that filmed and recorded the verbal protocols (modus operandi and thoughts verbally expressed) of drivers, cyclists and motorcyclists as they travelled the same transport route, found that the situational awareness of drivers, motorcyclists and cyclists was different when engaged in similar road situations (Salmon, Young, & Cornelissen, 2013). One quarter to one half of protocols and concepts verbally expressed by participants were unique to either drivers, motor cyclists or cyclists (Salmon, et al., 2013). Some of the cyclists' unique verbalisations were parked cars, taxi, service lanes, car doors, pedestrians, rubbish on path and eye contact which suggests that cyclists have additional hazards that require attention (Salmon et al., 2013). Elements off to the side of the road and hazards on the road surface reduced the time available for focusing on the other road users (Salmon, et al., 2013). The driver participants focused their attention on traffic lights and other traffic in front, behind and to the side which signified they sometimes missed cyclists and motorcyclists threading their way through traffic (Salmon, et al., 2013). That cyclists and drivers have visual scanning and attention of focus on different street elements and interactions may explain why there is a delay in the awareness of each other's presence resulting in less time for evasive actions (Räsänen & Summala, 1998b).

2.5.3 *Environmental factors*

Environmental hazards such as adverse weather conditions, poor road surfaces and debris on the road have contributed to cyclist crashes (Biegler et al., 2012). A Queensland study of incidence and severity of cycling injuries reported crash with or avoiding a crash with an object (38.0%) and skidding on wet, dirt or gravel and oily road or path surfaces (17%) when cycling were major crash causes of cyclists injuries (Heesch, Garrard, et al., 2011). Garrard et al. (2007) suggest that car drivers need to consider that the environment has a greater effect on cyclists, rather than blaming cyclists for what appears to be erratic behaviour. Drivers require an increased awareness and consideration of the space cyclists require to take evasive actions against adverse road conditions (Garrard, et al., 2008).

Cyclist non collision crashes are frequent and often do not result in serious injury. Non collision crashes injured over half of the 9,577 of cyclists hospitalised (17.4% of all persons injured in land transport accidents) during the 2008/2009 financial year (Henley & Harrison, 2012). Because of the high incidence of non collision events, cyclists are considered the least likely of road user types hospitalised to sustain a high threat to life injury (Garrard, et al., 2008; Henley & Harrison, 2012). Hospital data are considered to only record around half of cycling crashes as many crashes do not require medical treatment and go unreported (Washington et al., 2012). In a Queensland survey 27% of cyclists reported sustaining injuries in the previous 12 months, of these 67% were non collision, 49% did not require medical assistance only and 9.2% reported their injury to the police (Heesch et al., 2011). Cycling non collision crashes are frequently caused by adverse road and weather conditions, as the number of cyclists increases the probability of encountering this type of event also increases. Both drivers and cyclists need to be aware of the potential hazards and space required for evasive actions.

2.6 Issues that increase the perceived risk associated with cycling

Cycling is perceived as a risky activity by many drivers and non-cyclists with cyclists viewed as adventurous risk takers or at worst a danger to themselves and others (Gatersleben & Haddad, 2010; Schramm, et al., 2010). The media reinforces this perception by often giving negative commentaries of cyclists as dangerous law breakers and cycling as an extremely risky activity (Rissel, et al., 2010). Road rage and harassment are frequent incidents (Heesch, Sahlqvist, et al., 2011) that are not advantageous to creating a cycling friendly environment, and while these incidents may not directly cause crashes, these actions do increase the fear associated with cycling.

2.6.1 *Media portrayal of cyclists*

Media portrayal of cyclists has been associated with reinforcing the perception of cycling as a high risk activity (Wahlberg & Sjoberg, 2000). Research into newspaper reports on cycling published in Melbourne and Sydney between 1998 and 2008 found that over half of the reports portrayed cycling negatively with most news stories reporting injuries and fatalities (Rissel et al., 2010). Although sport and recreational cycling stories are favourable, many stories portray cyclists as dangerous law breakers (Wahlberg & Sjoberg, 2000). A number of studies evaluating the relationships between cyclists and drivers have revealed that many drivers and non-riders view cyclists as risk taking, dangerous road users who fail to obey road rules (Gatersleben & Haddad, 2010; Schramm, et al., 2010). Behaviours such a riding through red lights is often described as the cyclist traffic violation the most annoys drivers and is seen as typical behaviour (Johnson, Newstead, Charlton, & Oxley, 2011). However, an observational study conducted in Melbourne recorded a non compliance of 6.9%, and that cyclists turning left were more likely to be non compliant than cyclists travelling straight (Johnson, et al., 2011). Current riders may feel unfairly judged by this stereotype. Witnessing these types of behaviours taints the image of all cyclists, including those who were law abiding.

A Sydney study found drivers had a poor knowledge of road rules and lower levels of road rule knowledge were significantly associated with poor attitudes and intolerance towards cyclists (Rissel et al., 2002).While several other studies have identified negative attitudes of drivers towards cyclists (Garrard, Crawford, & Hakman, 2006; Heesch, Sahlqvist, & Garrard, 2011) and vice versa (O'Connor & Brown, 2010), these studies do not tie cyclist or driver attitudes to increased cyclist crash risk.

2.6.2 *Women and fear of harassment associated with cycling*

Fear of experiencing harassment from drivers has been identified as a barrier to commencing or continuing to cycle (Garrard, et al., 2006). Harassment and expressions of anger are not restricted to driver/cyclist interactions but due to physical exposure cyclists experience increased discomfort and perceived risk when being harassed (Garrard, et al., 2006). The range of actions extends from deliberately driving too close, throwing objects and blocking a cyclist’s path to shouting abuse; as well as horn blowing and obscene gestures (Garrard, et al., 2006). Harassment was experienced by two-thirds of Victorian (Garrard, et al., 2006) and three-quarters of Queensland study participants in the previous year (Heesch, Garrard, et al., 2011) Female cyclists in the Victorian study reported feeling significantly constrained by harassment from motorists, even though they tend to experience less incidents of intentional harassment: males (70.5%) females (56.6%) (Garrard, et al., 2006).

In 1980, Gardner used the term ‘situational disadvantage’, having observed that certain categories of people were targeted for harassment by people in public spaces, particularly minorities and social categories including women, the young and old, ethnic and racial minorities, gay men, lesbians and handicapped people (Gardner, 1980). While community awareness means it is no longer socially acceptable to harass certain minority groups, the low numbers of cyclists can leave a cyclist exposed and in a position of ‘situational disadvantage’, open to receiving harassment from drivers. The roles can be reversed when a motorist comes across a large group of cyclists; they can experience a similar degree of ‘situational disadvantage’ harassment. Therefore, while harassment may not directly result in a cycling crash, it is still an intentional form of aggression and decreases the feeling of personal safety.

It is a complex proposition to persuade people to change travel mode from car to bicycle. In Australia the risk associated with cycling is compounded by a portrayal of cycling as extremely risky and cyclists as dangerous road users rather than as an activity that is beneficial to the community. People have a habitual nature of repeated decision making when choosing a mode of transport rather than evaluating or planning for each time they travel (Matthies, Kuhn, & Klockner, 2002). Many strategies will be required to induce a behaviour change and convince drivers to leave their ‘safe cocoon’ (Aarts, Verplanken, & van Knippenberg, 1998; Matthies, et al., 2002). Cycling requires not only a safer cycling environment but also a change in community attitudes, where harassment is not acceptable behaviour and cycling is portrayed as a valid beneficial form of transportation.

Cyclists and drivers will encounter each other every day when travelling through the city streets, where a crash between these road users is objectively among the most dangerous for a cyclist. Both cyclists and drivers are required to increase their awareness of the presence of cyclists and associated crash risk and improve how to communicate their intended actions.

2.7 Gaps in current knowledge

There are a number of gaps that can be identified in the current research regarding perceived risks in cycling. While there are a number of studies that have investigated the perception of risk and identified the barriers associated with cycling, there are few studies that have examined the difference in the level of risk perceived by cyclists and drivers. The research has chosen to focus on perceptions of risk in interactions between cyclists and cars, rather than cycling generally, given that these interactions have been shown to result in the most serious injury outcomes. Furthermore, current research has not examined the effect of the type of interacting vehicle, whether it is a car or a bicycle, on the level of perceived risk across individual situations. The current research program has focused on cyclist and driver perceived crash risk for individual situations and traffic violations rather than the general riskiness of cycling.

Current research has identified lack of safety as a reason why females and non-cyclists do not commence or continue to cycle in Australia. However, research has not identified whether males and females perceive different levels of risk for the same interaction. This research program has examined these issues within the Australian context – given the greater disparity in cycling participation levels by gender in Australia. A comparison with the results from the study conducted in Paris (Chaurand & Delhomme, 2013) can identify if similar results would be found in Paris. This research can identify whether the greater risk perceived by female cyclists is cycling-specific or whether it is true also for female drivers in their judgements of the risks in their interactions with cyclists. This research has focused on experienced cyclists rather than novices or non-cyclists because they have the highest probability of having experienced the interactions under examination.

The literature review has identified a number of issues of concern for cyclist road safety regarding individual risk perception and its correlation with gender, mode of transport and the road environment. A comparative study of gender differences in risk perception when involved in objectively high risk traffic interactions will help identify predictors of perceived risk for cyclists and drivers in Australia. The research study will implement the methodology used by Chaurand and Delhomme (2013) to complete their study “A comparative study of cyclists and drivers perceived risk” adapted to Australian road conditions. Although the levels and contexts of cycling in France and Australia differ, the methodology used by

Chaurand and Delhomme (2013) provides a useful general approach to examine risk perception related to cycling. An in-depth examination of the correlation between risk perception and experience, perceived skill and self-reported participation in traffic violations will be undertaken, as was conducted in the French study. The study methodology will use the same measurements for data collection, and care will be taken to recruit similar experienced road users with consideration for the ability to compare the study with the French data. This research will focus on examining male and female perceptions of crash risk from both a cyclist and a driver perceptive, which has not been previously examined in Australian research.

2.8 Aims, research questions and hypotheses for the research

The primary aim of this research was to better understand the factors influencing perceived risk in cycling. The research aims to identify the level of crash risk perceived by experienced male and female, drivers and cyclists when one of the road users has engaged in risky behaviour or carried out a traffic violation. In addition to gender, the research will examine the influence on perceived risk of type of vehicle being operated, type of interacting vehicle, characteristics of the situation, age, experience, perceived skill, past violations and degree of responsibility for the violation. Thus, this research can determine whether cyclists and drivers feel more risk when interacting with another cyclist or driver. The research will evaluate experience, perceived skill and self-reported involvement in the traffic violations, which influence risk perception.

Based on the aims of the research and the literature reviewed in this chapter, six research questions and associated hypotheses were identified:

Research Question 1: Do male and female cyclists and drivers perceive different levels of crash risk in the same situation?

Hypothesis 1: Female car drivers and cyclists will perceive greater crash risk than male car drivers and cyclists (RQ1).

Research Question 2: Do cyclists and drivers perceive a different level of crash risk in the same situation?

Hypothesis 2: Car drivers will perceive higher crash risk than cyclists (RQ 2).

Hypothesis 3: Cyclists and drivers will differ in their perceived crash risk for some situations in a way that may contribute to crashes (RQ2).

Research Question 3: Does the type of interacting vehicle affect the level of perception of crash risk?

Hypothesis 4: Perceived crash risk will be higher when interacting with a car than with a bike (RQ3).

Research Question 4: Does the amount of experience and perception of skill influence the level of perceived risk of being in a crash?

Hypothesis 5: Lower levels of perceived crash risk will be associated with drivers' and cyclists' greater experience with their transportation mode (RQ4).

Hypothesis 6: Lower levels of perceived crash risk will be associated with higher levels of perceived skill (RQ4).

Research Question 5: Does the frequency of committing traffic violations affect the level of perceived risk?

Hypothesis 7: Perceived risk will decrease with higher frequency of past violations (RQ5).

Research Question 6: Does the degree of control (whether it is the individual or the other road user who is responsible for the violation) affect the level of crash risk?

Hypothesis 8: Lower levels of perceived crash risk will be associated with higher levels of responsibility for the violation (RQ6).

2.9 Summary

Increased participation in cycling and reduced motor vehicle use will create significant health, economic and environmental benefits for the community. Despite evidence that the health benefits outweigh risks many drivers and non-cyclists perceive cycling as an extremely risky activity (Garrard, et al., 2006; Gatersleben &

Haddad, 2010; Schramm, et al., 2010). It is important that all members of the community feel able to participate. At present many female drivers and pedestrians refuse to cycle because they perceive it as dangerous and risky compared with a car. The level of risk associated with cycling has been reinforced and amplified by negative media reporting, the absence of a cycling friendly environment and frequent harassment of cyclists by other road users. The perception of risk has been shown to influence decision making as well as actual behaviour; therefore, the examination of driver and cyclist risk perception is an important resource to the understanding of the transport network in Australia.

Different perspectives that explain gender differences in the level of perceived risk are consistently recorded by quantitative risk surveys. Literature recommends researchers consider gender not only as a variable per se, but consider separate comparisons of male and female data as this will reveal a more complex assessment of the information under examination. Research on the Australian transport environment and road user interactions has not examined differences in risk perception between male and female, cyclists and drivers. This information would provide a valuable resource identifying male and female differences of risk perception and traffic behaviours when planning road safety strategies, cycling infrastructure and networks.

An individual's level of perceived risk has been associated with a propensity to engage in risky behaviours and traffic violations. Greater involvement by males in traffic crashes has been correlated with the likelihood of involvement in risky behaviour and committing offences; it is considered that a greater perception of skill may result in overestimating their own capabilities and perceived control. Examining the correlation between perception of skill and perceived risk from a male and female perspective will provide greater detail of the effect; otherwise, the higher participation by males in Australian cycling may present male bias of any cyclist /driver comparison study.

Traffic crashes have a major impact on the community, and literature on traffic crash injury and fatalities in Australia identify that males are involved in higher numbers of crashes than females (Henley & Harrison, 2012). Research highlights that males have a higher involvement in fatal and extreme injury car crashes than females (Laapotti, 2004; Mayhew, et al., 2003; Ozkan & Lajunen, 2006). In contrast to motor vehicle crashes male cyclists are not significantly more likely than females to have a cycling injury or a serious cycling injury (Heesch et al., 2011; Washington et al., 2012). Therefore, the communities perceived high risk associated with cycling might be disproportionate to the actual risk of cycling (Fishman, et al., 2012).

The aim of the proposed research program is to better understand factors affecting cyclist safety in interactions with motor vehicles. The objective of this study is to understand the perceived crash risk experienced by male and female, cyclists and drivers when interacting with other cyclists and drivers in a number of situations of high objective crash risk.

This study will cover a range of road user interactions involving traffic violations, identified in Australian literature as crash causes frequently resulting in serious injury or fatality for cyclists. This subject has not previously been studied and will provide an additional resource for understanding the transport dynamics in Australian cities and other cities in the world. Results from this study will be used to further understand the effects of gender on risk perception, which has been reported in other Australian cycling research (Garrard, et al., 2008).

Chapter 3: **Method**

3.1 Introduction

The previous chapter presented the literature and the rationale for the research. It demonstrated that perceptions of risk are important influences on behaviour and that perceptions that cycling is a dangerous activity are contributing to lower levels of cycling participation, particularly by women. It proposed that the methodology used in an earlier French survey (Chaurand & Delhomme, 2013) could be adapted to examine the perceptions of risk by male and female Australian cyclists and drivers.

This chapter outlines the processes and methodology used to carry out this research project. The adaption of the questionnaire and the scales used to measure perceived risk, violations, perceived skill, experience and demographic characteristics are first described. The recruitment process and assignment of participants into respective cyclist and driver categories are then presented. The data checking and manipulation followed by the results of the exploratory analysis of the relationships between variables conclude the chapter.

3.2 Questionnaire

The questionnaire contained most of the items used in the French study by Chaurand and Delhomme (2013). The online survey comprised a cover page followed by sections focusing on perceived risk, frequency of committing violations, ratings of skill and ability and accidents and fines, and demographic characteristics. A printed copy of the online survey form is provided in Appendix A.

3.2.1 Adaptation of the questionnaire

The adaptation of the original French questionnaire was undertaken during a visit by the candidate's primary supervisor (Prof Narelle Haworth) to Prof Patricia Delhomme and Dr Nadine Chaurand at IFSTTAR in 2012. The process began with a preliminary translation into English by Prof Haworth. The preliminary translation was then reviewed and back-translated by Dr Chaurand. A substantial number of items were then modified to suit driving on the left-hand side of the road in Australia.

Some other items were changed because it was considered that the frequency and acceptability of particular behaviours differed substantially between the two countries. For example, the original item for cyclists which was translated as “Carrying a passenger behind me on my bike distracts me and interferes with my riding” was altered to “Carrying a child on my bike distracts me and interferes with my riding” because carrying a passenger (other than a child in a child bicycle seat) is not legal or common in Australia. However, it was decided to retain the item asking how frequently a cyclist rode without a helmet, despite the likely large differences in responses between Australia and France (where it is not required by law).

A small number of items proved difficult to translate and discussions were held until a consensus was reached among the researchers. For example, a number of options for translating “Ma façon de rouler est efficace” were discussed before agreeing that “I have an easy riding style” was the closest approximation.

The thesis uses the same terms for the perceived skill sub-scales identified by Chaurand and Delhomme (2013), namely perceived ‘Control’, ‘Overconfidence’ and ‘Incompetence’. However, these terms may not be equivalent in meaning to their everyday use in English. ‘Distractibility’ or ‘susceptibility to distraction’ might be a more appropriate translation than ‘Incompetence’.

3.2.2 Cover page

The cover page of the survey provided information to prospective participants to conform with University ethics requirements. It explained that car drivers and cyclists over 17 who held a drivers licence were eligible to participate, therefore, all cyclists in the study were also licensed to drive a car. In addition the cover page described the aims of the study and the nature of the questions to be asked.

Those who agreed to participate in the study were then asked whether they held a drivers licence and were thanked and excluded from the research if this was not the case. Participants were then asked: How often do you ride a bicycle? Those participants who responded Never, Less than once a month, 1 to 3 times a month were categorised as drivers. Participants who answered that they rode a bicycle once a week, 2 or 3 times a week, 4 to 6 times a week or at least once a day were categorised as cyclists. The survey program then used branching to direct the participants into items worded in relation to cycling or driving respectively.

3.2.3 Perceived risk scale

The first section of the questionnaire measured the perceptions of risk. The items asked the participant to imagine they were riding a bicycle (for cyclists) or driving a car (for drivers) in the early afternoon, in fine weather in a town. Six situations were then presented which involved violation of a road rule. The six situations investigated were: Failing to yield when required to at a cross intersection, Going through a red light, Failing to indicate when turning into a driveway, Crossing into the opposing lane when turning (Swerving), Tailgating a vehicle that has to stop suddenly and Not checking traffic when turning right at intersections.

For each of the situations, items related to three configurations were presented. In the first configuration, the vehicle is the same as that operated by the respondent (‘another rider’ for cyclists, ‘another car driver’ for car drivers). In the second configuration, the vehicle is the opposite of that operated by the respondent. In the third configuration, the respondent is the operator ‘you are...’ and therefore the vehicle corresponds to that operated by the respondent.

Participants rated the perceived likelihood that they would be involved in a crash if they were involved in each situation within the next three years on a five point scale from 1= very unlikely to 5= very likely. Examples of perceived risk items are presented in Table 3.1.

A study of the accuracy of participants when self-reporting accidents and traffic violations behaviour in driver behavioural questionnaires identified that the result is influenced by the length of time period under consideration (Lajunen & Ozkan, 2011). Lajunen and Ozkan (2011) recommend a maximum time period of five years for self-reporting accidents, as this reduces the inaccuracy caused by various factors such as the definition of reportable accident between individuals, the intentional or unintentional misrepresentation bias and the memory of individuals. For this survey a period of three years was considered to provide the participant with a reliable self-reporting time period.

Table 3.1 Example of items measuring perceived risk

Cyclist items
You are on your bike, alone, and you're riding in a built-up area.
In your opinion, how likely is it that you will have an accident in the next 3 years, if:
a. You are riding through a X intersection on a green signal when another rider on the road to your left runs the red light towards you
b. You are riding through a X intersection on a green signal when a car on the road to your left runs the red light towards you
c. You run the red light at an X intersection while a car with a green signal is driving through the intersection.
Driver items
You are in your car, alone, and you're driving in a built-up area.
In your opinion, how likely is it that you will have an accident in the next 3 years, if:
a. You are driving through a X intersection on a green signal when another car driver on the road to your right runs the red light towards you.
b. You are driving through a X intersection on a green signal when a bicycle on the road to your right runs the red light towards you.
c. You run the red light at a X intersection while a bicycle with a green signal is driving through the intersection.

For each question, click on the circle corresponding to your response: Very unlikely, unlikely, neither unlikely or likely, likely, very likely

3.2.4 Violations scale

In the second section of the questionnaire, participants rated the frequency from 1=never to 5=very often that they themselves committed the violations described in the situations when they were riding their bike (for cyclists) or driving their car (car drivers). An overall violation score was computed by averaging the frequencies for each of the violating behaviours. Thus the average violation score could range from 1 to 5.

3.2.5 Perceived skill scale

The third section measured participant perceptions of their skill and ability at cycling (cyclists) or driving (drivers). The section began by asking participants to rate their level of agreement with 17 different statements that measured perceived

Control, Overconfidence and Incompetence on a five point scale from 1=not at all to 5 =completely. The items are presented in Table 3.2.

Table 3.2 Items measuring perceived skill

When riding your bike (driving your car), how well do the following statements describe you?
- **Control**
- I have no problems adapting to the road conditions
- I behave carefully
- I can ride(drive) well regardless of the amount of traffic
- I can ride(drive) well regardless of the weather
- I am able to predict what other road users will do
- I can control my bike(car) regardless of my speed
- **Overconfidence**
- I ride/drive confidently
- I can thread through other vehicles easily
- I have good reflexes
- I have an easy riding(driving) style
- I can control my bike(car) even when I’m tired
- **Incompetence**
- My thoughts are elsewhere
- Carrying a child on my bike (The presence of passengers in the car) distracts me and interferes with my riding/driving
- I have trouble riding(driving) at night
- If I’m concerned about something, that can affect my riding(driving)
- Sometimes I fail to detect motorcycles or scooters when I’m on the road
- I am careless when I am in a hurry
Not at all/ Not much/ A bit /A lot/ Completely

Participants were then asked to rate their level of agreement with a number of statements about current road rules and behaviours (see Table 3.3).

Table 3.3 Example of items measuring agreement with current road rules and behaviours

Please indicate your level of agreement with the following statements
Speed limits are justified
Road safety laws should be stricter
Drink driving laws should be strengthened
The penalties for traffic offences should be increased
Totally disagree/disagree/neither agree nor disagree/agree /totally agree

3.2.6 Measuring experience

Experience was measured by a set of items regarding frequency of use of the bicycle (for cyclist) or car (for drivers), duration and distance travelled and time spent travelling each week. For the average weekly distance the ranges for drivers were five times the ranges for cyclists.

Finally, participants were asked how many crashes they had experienced and how many times they had been fined or lost demerit points in the last three years.

3.2.7 Demographic characteristics

The fourth section of the questionnaire gathered information about the gender, age, postcode of residence, distance travelled to work or study and profession of participants. By utilising the recorded postcode it was possible to identify the Socio Economic Index for Areas (SEIFA) of the respondent’s residential area. The SEIFA score was developed by the Australian Bureau of Statistics and summarises the socio-economic characteristics for a particular area based on income, education and housing, it is standardised against a mean of 1,000 with a standard deviation of 100. The lowest most disadvantaged economic areas scoring 10 per cent of areas is given a decile number of 1, up to the highest most advantaged 10 per cent of areas which are given a decile number of 10 (Pink, 2011).

Participants were asked to nominate the sizes of the towns where they resided and where they worked, by choosing from five categories (see Table 3.4), corresponding to the first five of the Rural, Remote and Metropolitan Areas **(**RRMA) classification (Australian Bureau of Statistics, 2011).

Table 3.4 The Rural, Remote and Metropolitan Areas (RRMA) classification (Aust Gov 2004)

Capital City	Metropolitan zone	M1
> 100,000 Not Capital City	Other Metropolitan Centres	M2
25,000–99,99	Rural zone Large Rural Centres (urban centre population)	R1
10,000–24,999	Small Rural Centres (urban centre population)	R2
< 10,000	Other Rural Areas (urban centre population)	R3

3.2.8 Pilot and pretesting of Study

The questionnaire was piloted in January 2103 on a small group of people to identify any concerns regarding the wording of questions, the understanding of terms used and to ensure the key survey program functioned correctly.

Chaurand and Dehlomme (2012) had originally pretested ten risky situations that they had identified from previous work and official statistics. Of the ten situations four situations were rejected: "going through a yellow light, overtaking with-out visibility in front, riding /driving at a high speed when the vehicle ahead slows down, not checking traffic on the right when turning at an intersection" because they either presented internal inconsistency or showed a floor effect on the risk measure.

3.3 Recruitment process

The questionnaire was conducted using online Key Survey software. The survey was launched on the 12th January, 2013 and closed on the 31st May, 2013. Participation was voluntary and those respondents who provided contact details were entered into a random draw to win one of five $100 vouchers at the conclusion of the survey. The Queensland University of Technology Human Ethics Committee confirmed the study as meeting the requirement of the National Statement on Ethical Conduct in Human Research (approval number 1200000528).

There were three major approaches to the recruitment of participants: email invitations sent through the CARRS-Q InSPiRS Panel, an invitation to participate containing the link for the survey placed on cycling web sites, and word of mouth.

3.3.1 CARRS-Q InSPiRS Panel

The first recruitment approach was through the CARRS-Q InSPiRS Panel. The InSPiRS panel was established by CARRS-Q to assist with research into preventing accidents and improving road safety. Email invitations were sent to panel members with a link to the online survey. Inclusion criteria required participants to be over 17 years of age, have a car driver licence and live in a major city or in a inner regional area.

A total of 658 invitations to participate were emailed to panel members. Of these panel members, 241 had a drivers licence and had nominated at time of recruitment to the panel riding a bike in the last 12 months. It was expected that most of this group would be eligible to participate as bicycle riders. Another 417 panel members had nominated that they held a drivers licence, drove at least once a week and had not, at time of panel recruitment, ridden a bike in the last 12 months. It was expected that most of this group would be eligible to participate as car drivers. Given the delay between when the panel members had originally provided information regarding their bicycle use, it was considered likely that some members may have changed from being riders to non-riders and vice versa. One panel member requested a paper survey. This was sent out and was returned.

Emails were successfully sent to 515 panel members (emails were unable to be delivered to 49 potential cyclists and 94 potential car drivers). Of the participants who completed the survey 27 participants nominated they were panel members (3 were categorised as cyclists and 24 were categorised as car drivers in the survey). Thus the overall response rate for InSPiRS members was 5.2% with 1.5% of potential cyclists and 7.4% of potential car drivers participating.

3.3.2 Cycling websites

Given the low numbers of cyclists in the INSPiRS panel and the low response rate, additional methods of recruitment were undertaken to boost sample size. The survey was publicised with an invitation and link placed on the CARRS-Q website on the Participate in Road Safety Research page and the websites of the Amy Gillett Foundation, Bicycle Network Australia and Brisbane Cyclist. The Amy Gillett Foundation also publicised the survey information in their newsletter.

3.3.3 Queensland University of Technology Research Students and Staff

The Institute of Health and Biomedical Innovation at the Queensland University of Technology emailed an invitation to participate to all research staff, students and members on the 1st May, 2013.

3.3.4 Asia Pacific Cycle Congress

Interest in the survey was expressed by the delegates attending the Asia Pacific Cycle Congress, where a poster outlining the research was presented on 12th March, 2013. The poster included the URL for the survey and also a QR code to access the survey. The survey information was shared by delegates with fellow members of Bicycle User Groups (BUGS) which have members throughout Queensland.

The websites and newsletters resulted in an unknown number of potential participants being informed of the existence of the survey. It is unclear how many potential participants saw the advertising on the websites. However, 27 (4.5%) participants nominated they were InSpiRS panel members, 219 (38%) participants nominated they had heard about the survey on a cycling website, 217 (38%) participants recorded ‘other’ and 133 (23%) participants cited ‘word of mouth’.

3.4 Participants

A total of 768 participants accessed the survey but not all participants completed all items. The first question asked the participant if they held a drivers licence; if they did not hold a drivers licence (2 participants) they were thanked and excited the survey. All participants who indicated they held a licence were directed to question 2 of the survey. Figure 3.1 summarises the number of driver (blue) and cyclist (green) participants completing each section of the questionnaire. The white areas identify the number of participants leaving the survey and the question number.

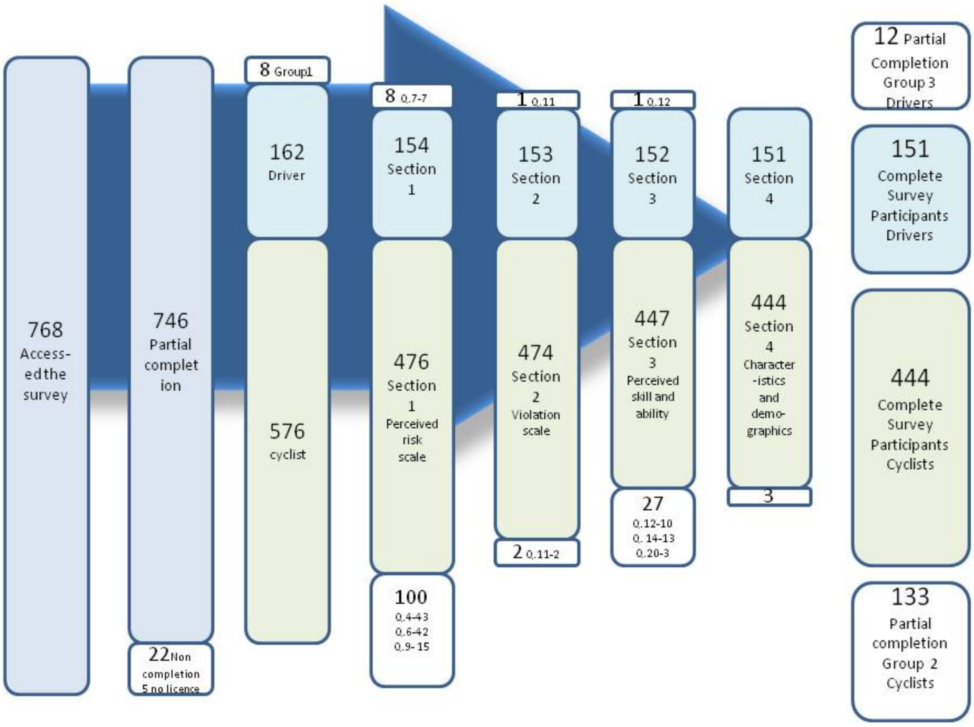


Figure 3.1 Diagram representing the number of driver and cyclist participants completing each section of the questionnaire

3.4.1 Categorising participants as drivers or cyclists

The second question asked the participant how often they rode a bicycle. The 576 participants who indicated they cycled once a week or more often were categorised as cyclists and directed into the cycling survey. The 170 participants who indicated the frequency they cycled was less than once a week were categorised as drivers and directed into the driver survey.

There was a significant statistical relationship between the frequency that participants rode a bicycle and whether or not they completed all of the survey items ($\chi 2$ (6) = 17.24, p = .008). Of participants who did not finish the survey, 87.5% indicated they rode a bicycle once a week or more. Participants who recorded riding at least once a day and once a week were least likely to complete the survey and drivers who never rode a bicycle were most likely to complete the survey (see Table 3.5).

Table 3.5 Results from Question 2: How often do you ride a bicycle?

Frequency of riding	Completion	Partial Completion	Statistical test
Drivers			
Never	79 (13.3%)	6(3.9%)	
Less than once a month	52 (8.8%)	9 (5.9%)	
1 to 3 times per month	20 (3.4%)	4 (2.6%)	
Cyclists			χ2(6) = 17.24, p = .008
Once a week	20 (3.4%)	10 (6.9%)	
2 or 3 times a week	105 (17.7%)	26 (18.1%)	
4 to 6 times a week	230 (38.7%)	65 (42.8%)	
At least once a day	88 (14.8%)	32 (21.1%)	
Total	594 (79.6%)	152 (20.4%)	

There were 8 driver participants who did not complete any further questions. An additional 8 drivers and 100 cyclists did not complete all section 1 questions regarding perceived risk. It would be very interesting to compare the characteristics of these participants with those who completed the survey, but the only information available for these partial completion participants is how often the cyclists ride a bicycle around town (see Table 3.6). Those who completed and those who failed to complete did not differ statistically in the frequency that they used a bicycle to travel around town to do shopping or travel to work.

Table 3.6 Cyclist Survey, Question 3: frequency of bicycle use to travel around town

Bicycle use to travel around town	Partial Completion (n=746)	Complete (n=595)	Statistical test
Never	11(8.3%)	24 (5.4%)	
Less than once a month	9 (6.8%)	24 (5.4%)	
1 to 2 times per month	6 (4.5%)	19 (4.3%)	
Once a week	13 (9.8%)	33 (7.4%)	χ2(6) = 3.99, p = .678
2 or 3 times a week	23 (17.3%)	100 (22.6%)	
4 to 6 times a week	50 (37.6%)	178 (40.2%)	
At least once a day	21 (15.8%)	65 (14.7%)	

There are a number of possible reasons for the high participant loss during the questions at the start of the survey. These questions investigated high-risk scenarios and it is possible that imagining crash interactions may have been uncomfortable for a number of people. Participants who were cyclists were more likely to not complete the survey than car drivers.

Some participants may have felt being asked to imagine the likelihood of a crash resulting from an interaction or traffic violation that they are unlikely to voluntarily engage in a waste of time. A misunderstanding of the information or the clarity of the questions for some participants may have resulted in them leaving the survey.

Some participants may have commenced the survey and decided to complete it at a later time resulting in a new survey being recorded.

A total of 595 participants completed all questions in the survey of whom 444 (74%) participants were categorised as cyclists and 151 (26%) as car drivers. These participants are categorised as 'Complete Survey Participants' and the data from this group is analysed.

3.4.2 Data manipulation and checking

Data from the online survey was transferred from Key Survey to SPSS (version 17) software. Pearson's Chi-square tests were performed to identify statistically significant differences at the .05 level between the responses of cyclists and drivers. Some of the original variables were recoded using SPSS into new variables to strengthen the power for statistical analyses. The data collected from the complete survey participants has been analysed and their results are presented in the following section. All questions have been abbreviated in the report; the detailed information for each question is in Appendix A.

Histograms of the data showed the distribution of risk rating for some items were bimodal (Appendix B, Figures B1 and B2), specifically items where the participant was the person committing the violation. These items were recoded as binary variables into two groups: participants who responded likely or very likely were assigned to one group and a second group of participants who responded neither likely or unlikely, unlikely or very unlikely. For these items, the results of the analysis are presented in terms of percentages of respondents who responded likely or very likely, rather than mean values.

The French study included all of the people who had answered a question (regardless of whether there were missing data for other questions) in their initial calculations of means. Participants who had missing data for one or more of the variables were excluded in the ANOVAs. For this survey an analysis of means calculated for each of the six situations collected from the total participants was compared to the complete survey participants (Appendix B, Table B1). No major variation in the results was observed. Therefore, the results section of this survey contains data calculated solely from the cyclist and driver participants who completed the survey.

3.4.3 Reliability of the perceived skill scale

The survey presented 17 questions to measure perceived skill, the items on the scale were divided into three sub scales Control, Overconfidence and Incompetence. To measure the internal consistency of the scales they were tested in SPSS using Cronbach's alpha, which constructs a variance - covariance matrix of all questions to assess the consistency of the participants response (Field, 2009). For comparing groups 0.70 to 0.80 is regarded as satisfactory, however, values lower than 0.70 are accepted for psychological constructs and the alpha value is dependent on the number of questions on the scale (Field, 2009). The Cronbach's alpha for overall 17 questions was for all participants $\alpha = 0.554$, cyclists $\alpha = 0.562$ and drivers $\alpha = 0.557$.

The reliability of three subscales identified by Chaurand and Delhomme (2013) were examined. The overall reliability of the perceived Control subscale was moderate overall and a little higher for cyclists than drivers (6 items, cyclist $\alpha = 0.667$, driver $\alpha = 0.512$, total $\alpha = 0.635$). For Overconfidence, the reliability was somewhat higher (5 items, cyclist $\alpha = 0.725$, driver $\alpha = 0.726$, total $\alpha = 0.734$). The reliability of the perceived Incompetence subscale was somewhat lower (6 items, cyclist $\alpha = 0.534$, driver $\alpha = 0.607$, total $\alpha = 0.565$).

Removing the item "I have no problem to adapt to the road conditions" would have increased the reliability of the perceived Control subscale (amended values: α cyclist=0.720, α driver =0.720, α total=0.680). Removing the item "I have no trouble carrying a child on my bike" or "I have no trouble carrying a passenger in my car" would have increased the reliability of perceived Incompetence subscale for cyclists to 0.680 but would have little effect on the reliability for drivers (0.557) or the participant sample as a whole (0.587). It was decided to retain the items in the subscales in accordance with Chaurand and Delhomme (2013).

3.4.4 Exploratory analysis of relationships between variables

Prior to conducting analyses of variance, correlations between variables were examined to provide an initial understanding of the relationships between them and to guide the structure of the later analysis.

A repeated measures ANOVA was conducted using the dependent variables, Configuration (another cyclist or driver as the interacting vehicle) and each of the six situations (Failing to give way, Going through a red light, Not signalling when turning, Swerving, Tailgating and Not checking traffic).

Mauchly's sphericity test was conducted for each of the effects in the model. Mauchly's test indicated that the assumption of sphericity had been violated for the main effects of Situation χ^2 (14) = 146.65, p < .001. Therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity (*e* = .91 as the main effect for situation). The corrected values of Greenhouse-Geisser will be reported in this analysis.

Table 3.7 identifies that Participant (cyclist or driver) is significantly correlated with Age group (r=.095, p=.020) and the mean age of cyclists was younger than drivers. Gender (r=-.279, p<.001) showed more males in the cyclists group and more females in the drivers group, and that the later analyses of variance will need to include interaction terms to allow their separate effects to be measured. It also identifies that the experience variables (weekly time and frequency of use) are correlated with Participant type: cyclists had increased weekly time (r=-.193, p<.001) and drivers had increased frequency of monthly use (r=.311, p<.001, respectively). Each of the perceived skill subscales were also associated with Participant type: cyclists had higher scores for Control (r=-.123, p=.003) and Overconfidence (r=-.220, p<.001) and drivers had higher scores for Incompetence levels (r=.200, p<.001).

It identifies that gender is significantly correlated: males had higher levels of weekly time (r=.167, p=<.001), monthly use (r=.038, p<.001), Violation (r=.096, p<.001), Control (r=.183, p=<.001), Overconfidence (r=.238, p<.001) and lower levels of Incompetence (r=.-190, p<.001).

The Violation score decreased with Age group (r=-.134, p=.001), was higher for males, and increased with monthly use (r=.110, p=.007). The Violation score was correlated with perceived skill subscale scores, decreased with increased Control (r=.-120, p=.003) and increased with higher Incompetence scores (r=.307, p<.001).

All three of the perceived skill subscales increased with time spent riding, but frequency of use was only associated with Overconfidence (r=-.041, p=.032). There was a negative relationship between perceived Control and Violation score, and also a positive relationship between Incompetence and Violation score. As expected, perceived Control and Overconfidence were positively associated and both were negatively associated with Incompetence.

Table 3.7 Correlation between cyclist or driver, age group, gender, weekly time, monthly frequency of use, the self-reported violations, perceived Control Overconfidence and Incompetence

Correlation Sig. (2-tailed)	Cyclist or driver	Age group	Gender	Weekly time	Monthly use	Violation	Control	Over-Confid-ence	Incom-petence
Cyclist or driver	1	**.095* .020**	**-.279** .000**	**-.193** .000**	**.311** .000**	-.041 .324	**-.123** .003**	**-.220** .000**	**.200** .000**
Age group		1	.043 .296	.065 .111	.008 .846	**-.134** .001**	-.010 .812	-.044 .282	.025 .551
Gender				**.167** .000**	**.038 .000**	**.096* .000**	**.183** .000**	**.238** .000**	**-.190** .000**
Weekly time				1	**.219** .000**	-.024 .565	**.228** .000**	**.260** .000**	**-.133** .001**
Monthly use					1	**.110** .007**	.063 .123	**.111** .007**	-.041 .320
Violation						1	**-.120** .003**	-.061 .140	**.307** .000**
Control							1	**.669** .000**	**-.361** .000**
Overconfid-ence								1	**-.380** .000**
Incom-petence									1

** Correlation is significant at the 0.05 level (2-tailed).*
*** Correlation is significant at the 0.01 level (2-tailed).*

Bivariate correlations between rated level of risk and the between-subjects variables were calculated for each combination of the six situations and two configurations (Table 3.8). The third configuration (where the participant is asked to imagine that they are the party committing the violation) was excluded because of the bimodal distribution of risk ratings identified earlier and the results are presented in Chapter 4.

Overall, risk ratings were associated with participant type (cyclist or driver) for eight of the twelve scenarios. Generally, cyclist participants gave lower ratings than drivers when the scenario involved a cyclist and higher ratings when the interaction involved a driver for Swerving, Tailgating and Not checking traffic. The scenarios where this relationship was not significant were car Going through a red light, car Swerving, car Tailgating, and car Not checking traffic.

Given the relationship between Age group and Participant type, it is possible that the relationship between risk ratings and Age group observed for three of the scenarios may reflect confounding which was examined in the later multivariate analyses.

Risk ratings were related to Gender for 10 of the 12 scenarios, with lower ratings by males in each instance, but this may at least partly reflect the greater proportion of males among cyclists. The two experience measures (weekly time, monthly use) were significantly correlated with risk ratings on fewer than half of the scenarios and not for the same scenarios. Incompetence was significantly correlated with risk rating in 10 of the 12 scenarios. Perceived Control and Overconfidence were significantly correlated with risk rating in situations that involved a cyclist who violated a road rule. There was no significant relationship between risk ratings and violation score. Participants' self-reported frequency of engaging in the traffic violations under examination had no significant relationship with the level of risk rated for any of the scenarios.

Table 3.8 Bivariate correlations between situations, rated level of risk and the between-subjects variables for each of the situations and the two configurations
The top row is value of correlation and the lower row is value of p

Correlation Sig. (2-tailed)	Cyclist or driver	Age group	Gender	Weekly time	Month-ly use	Viola-tion	Perceiv-ed Control	Over-Confid-ence	Incom-petence
Cyclist Failing to yield	.248** .000	-.013 .758	-.158** .000	-.027 .513	.015 .716	-.056 .175	-.174** .000	-.183** .000	.256** .000
Driver Failing to yield	-.301** .000	-.113** .006	.023 .578	.092* .026	-.160** .000	-.024 .564	-.047 .249	.073 .076	-.022 .587
Cyclist Going through a red light	.238** .000	-.009 .834	-.243** .000	-.025 .535	.028 .490	-.053 .199	-.136** .001	-.135** .001	.193** .000
Driver Going through a red light	-.077 .060	-.152** .000	-.170** .000	.076 .063	-.034 .407	-.049 .228	.003 .949	.081* 0.047	.048 .247
Cyclist Not signalling when turning	.113** .006	.015 .723	-.233** .000	-.067 .103	-.089* .030	-0.02 0.629	-.165** .000	-.187** .000	.219** .000
Driver Not signalling when turning	-.165** .000	-.027 0.504	-.055 .178	.028 .503	-.125** .002	.029 .487	-.054 .187	-.025 .535	.090* .028
Cyclist Swerving	.299** .000	.056 .174	-.180** .000	-.083* .044	0.060 .145	.000 .145	-.153** .000	-.186** .000	.207** .000
Driver Swerving	.040 .334	-.008 .850	-.110** .007	.096* .019	-.040 .301	-.075 .066	-.069 .092	-.032 .442	.105* .010
Cyclist Tailgating	.099* .015	-.046 .263	-.179** .000	.001 .973	-.019 .643	-.063 .122	-.110** .007	-.072 .077	.106** .010
Driver Tailgating	.040 .328	-.115** .005	-.149** .000	.056 .175	.000 .991	-.035 .395	-.034 0.402	.046 .259	.070 .090
Cyclist Not checking traffic	.210** .000	-.064 .118	-.211** .000	-.082* .045	-.033 .415	-.040 .332	-.153** .000	-.131** .001	.172** .000
Driver Not checking traffic	.043 .299	-.068 .100	-.196** .000	-.029 .475	-.089* .030	-.035 .401	-.108** .009	-.052 .207	.120** .003

**Correlation is significant at the 0.05 level (2-tailed).*
*** Correlation is significant at the 0.01 level (2-tailed).*

Chapter 4: **Results**

4.1 Introduction

The previous chapter described the methodology of the study and presented exploratory analyses to inform later treatment of the data. It identified the need to separately analyse the effects of responsibility for the violation (the participant or another person operating the same type of vehicle) because of the bimodal distributions of perceived risk for some of these items.

This chapter presents the most important results of the survey, with supporting information being provided in Appendices B and C. It begins by summarising the demographic characteristics of the respondents and then describes their travel characteristics, self-reported crash and infringement history and self-reported frequency of those violations featured in the questionnaire items. The ratings of their perceived skill and perceived risk are then presented. The analyses of variance of the risk ratings then follow. The remaining sections present the results that are specific to each of the research questions outlined in Chapter 2. The chapter concludes with a summary.

4.2 Demographic characteristics of participants

Basic socio-demographic information was collected for each participant. Information regarding age and gender is reported in this section. Other information regarding postcode and the size of the town or city where they live can be found in Appendix B, Table B2. Overall, 235 (39.6%) females and 359 (60.4%) males completed the survey. Among the respondents classified as cyclists, 140 (31.5%) were female and 304 (68.5%) were male. There were 95 (62.9%) female and 57 (37.1%) male respondents classified as drivers. The gender distribution differed significantly between the cyclist and driver samples (χ^2 (1) = 46.438, $p < .001$).
Survey participants ranged between 19 and 78 years of age, with a mean age of 45.0 years. The mean age of cyclists was younger than that of drivers (44.55 years versus 47.87 years, t (593) = -2.95, $p < .001$). Table 4.1 shows that there were relatively fewer older cyclists compared to drivers (χ^2 (7) = 26.69, $p < .001$).

Table 4.1 Gender and age of cyclist and driver respondents

Characteristics of respondents	Cyclists (n=444)	Drivers (n=151)	Statistical tests
Male	304 (68.5%)	56 (37.1%)	χ^2 (1) = 46.44, p < .001
Female	140 (31.5%)	95 (62.9%)	
Mean Age	44.55	47.87	*t* (593) = -2.95, p = .001
SD	11.15	14.04	
19 and under	1 (0.2%)	0 (0%)	
20 -29	46 (10.4%)	22 (14.5%)	
30 -39	103 (23.3%)	25 (16.4%)	χ^2 (7) = 26.69, p < .001
40 - 49	126 (28.4%)	28 (18.4%)	
50 - 59	128 (28.9%)	47 (30.9%)	
60 -69	35 (7.9%)	21 (13.8)	
70 -79	3 (0.7%)	8 (5.3%)	

The mean age of male and female participants did not differ significantly, (44.75 years versus 45.81 years, *t* (593) = 1.05, p = .292) with no significant differences in the male and female Age group distributions, (χ^2(7) = 3.87, p = .794) (Appendix B, Table B2). On average, male drivers were older than female drivers (51.86 years versus 45.53 years, *t* (149) = -2.73, p = .003) and the age of male and female cyclists did not differ (44.70 years versus 44.22 years, *t* (442) = -42, p = .338) (see Table 4.2).

Table 4.2 Distribution of participants by transport, Age group and gender

	Female cyclist (n=140)	Male cyclist (n=304)	Female driver (n=95)	Male driver (n=56)	Statistical test
Mean Age			45.53	51.86	*t* (149) = -2.73, p = .003
SD			13.16	14.68	
Mean Age	44.22	44.70			*t* (442) = -42, p = .338
SD	10.93	11.24			
19 and under	0 (0%)	1 (0.3%)	0 (0%)	0 (0%)	
20 - 29	14(10.0%)	32 (10.5%)	15(15.8%)	7 (12.5%)	
30 - 39	36 (25.7%)	67 (22.0%)	20 (21.1%)	5 (8.9%)	χ^2(18) = 42.67, p < .001
40 - 49	41 (29.3%)	87 (28.6%)	20 (21.1%)	8 (14.3%)	
50 - 59	35 (25.0%)	93(30.6%)	27 (28.4%)	20 (35.7%)	
60 - 69	13 (9.3%)	22 (7.2%)	10 (10.5%)	11 (19.6%)	
70 -79	1 (0.7%)	2 (0.7%)	3 (3.2%)	5(8.9%)	

4.3 Travel characteristics

Research Question 4 asks whether experience in terms of current driving and cycling affects perceived risk. Therefore, basic data regarding travel characteristics of the sample is provided here to provide background information on the sample.

4.3.1 Cycling frequency and distance ridden

Over half of the cyclists (54.9%) reported riding more than 4 times per week (see Table B.4). Over half (52.1%) rode more than 100 km per week, with 91.2% riding 20 km or more per week (see Table 4.3). They were more likely to ride on weekdays (69.5% to 80.8%) than on weekends (63.4% and 63.4%) (see Table 4.4). The median time ridden was between 5 and 10 hours; the median frequency was between 4 and 6 times a week; and median distance travelled was over 100 km per week.

Table 4.3 Distance cycled per week

On average how far do you ride each week?	Cyclist (n=444)
Less than 5 km	4 (0.9%)
Between 5 km and less than 20 km	35 (7.9%)
Between 20 km and less than 50 km	61 (13.7%)
Between 50 km and less than 100 km	112 (25.2%)
100 km and more	232 (52.3%)

Table 4.4 Days cycled during the week

Days of the week in which you ride your bike	Cyclist (n=444)
Monday	308 (69.5%)
Tuesday	342 (77.2%)
Wednesday	352 (79.5%)
Thursday	358 (80.8%)
Friday	328 (74.0%)
Saturday	281 (63.4%)
Sunday	281 (63.4%)

Cycling four or more times per week was reported by 74.4% of male and 66.4% of female cyclists ($\chi^2(3) = 4.82$, $p = .185$) with both male and female cyclists spending similar lengths of time cycling ($\chi^2(5) = 6.22$, $p = .285$). There was a statistically significant difference between male and female participants in the distance ridden each week ($\chi^2(4) = 14.43$, $p = .006$), where 57.6% of male cyclists rode over 100 km compared to 40.7% female cyclists. However, 32.1% of female cyclists and 22.0% of male cyclists rode between 50 and 100 km per week (see Appendix B, Table B5).

4.3.2 Driving frequency and distance driven

One third of drivers (32.5%) drove less than 50 km per week, with 52.4% of drivers travelling less than 100 km per week (see Table 4.5). Travelling between 100 and less than 200 km was recorded by 20.5% of drivers, with a further 27.2% who travelled over 200 km per week.

Table 4.5 Distance driven per week

On average how far do you drive each week?	Driver (n=151)
Less than 10 km	8 (5.3%)
Between 10 km and less than 50 km	41 (27.2%)
Between 50 km and less than 100 km	30 (19.9%)
Between 100 km and less than 200 km	31 (20.5%)
Between 200 km and less than 300 km	21 (13.9%)
Between 300 km and less than 400 km	14 (9.3%)
400 km and more	6 (4.0%)

Drivers reported spending less time per week travelling than cyclists ($\chi^2(5) = 60.73$, $p < .001$), with 40.3% of drivers spending more than 5 hours per week driving compared with 63.1% of cyclists spending more than 5 hours cycling per week (see Table 4.6). The largest group of cyclists (41.9%) identified they rode between 5 and 10 hours per week.

Table 4.6 Cyclist and driver weekly time spent riding/driving

On average how much time do you spend (riding/driving) each week?	Cyclist (n=444)	Drivers (n=151)
Less than 30 minutes	2 (0. %)	6 (4.0%)
Between 30 minutes and less than 2 hours	31 (7.0%)	39 (25.8%)
Between 2 hours and less than 5 hours	131 (29.5%)	45 (29.8%)
Between 5 hours and less than 10 hours	187 (42.1%)	31 (20.5%)
Between 10 hours and less than 15 hours	74 (16.7%)	20 (13.2%)
15 hours and more	19 (4.3)	10 (6.6%)

4.3.3 Purpose of travel and distance travelled to work

The analyses of responses regarding frequency of travel for various purposes and their distance travelled to work are presented in Appendix B. In general, drivers used cars more for travel to work and shopping than cyclists, with 57.6% of drivers and 14.6% of cyclists reporting driving or riding once a day for work or shopping (Appendix B, Table B4). It should be noted that 70 (15.1%) cyclists who indicated they rode to work less than once a week would not have been classified as cyclists in Chaurand and Delhomme's (2013) study.

Three quarters of male cyclists (73.0%) and two thirds of female cyclists (65.0%) rode their bicycle often or very often to travel to work or study ($\chi^2(3) = 7.97$, $p = .047$). One quarter of female cyclists (22.9%) never used their bicycle to travel to work whereas 12.5% of males never used their bicycle to travel to work or study (see Appendix B, Table B6). Both male and female cyclists did not use their bicycle to do shopping or run errands, almost all cyclists rode their bike often or very often for recreation and leisure (see Appendix B, Table B6).

More male drivers (69.6%) used their car every day compared with 50.5% of female drivers ($\chi^2(6) = 14.56$, $p = .024$). Male drivers spent significantly more time driving, with 30.4% of male drivers spending over 10 hours driving per week in comparison to 13.7% of female drivers ($\chi^2(5) = 12.71$, $p = .026$) (see Appendix B, Table B7).

4.4 Self-reported crash and infringement history

Participants were asked if they had been involved in one or more accidents in the last three years (as a cyclist for cyclists and as a car driver for car drivers). The question specified that an accident could be minor damages, a property damage-only accident, or a serious accident. The term 'accident' rather than 'crash' was used to encourage the participants to include a broader spectrum of incidents, for example, those that had not resulted in serious injury. Cyclists were more likely than drivers to report being involved in an accident in the past three years (47.3% versus 21.2%, $\chi^2(1) = 29.62$, $p < .001$). Participants who identified they had been involved in one or more accidents were asked to describe the year and cause (see Appendix B, Table B10). Male and female cyclists did not differ significantly in their likelihood of having been involved in one or more crashes in the past three years (50.0% versus 41.4%, $\chi^2(1) = 2.83$ $p = .093$) or in the type of crash they had been involved in (see

Appendix B, Table B10). There was no statistically significant association between gender and crashes for drivers ($\chi^2(1) = 1.40$, $p = .240$) (see Appendix B, Table B11).

Drivers were more likely to report having received traffic fines when driving within the past three years than cyclists when riding during the same period (32.5% versus 2.5%, $\chi^2(1) = 111.64$, $p = .001$).

Helmets were reported as always worn by 90.3% and worn most of the time by 7.7% of cyclist participants. Seatbelts were reported as always worn by 95.4% and worn most of the time by 3.3% of driver participants.

4.5 Self-reported frequency of committing violations

Participants rated the frequency (from 1=never to 5=very often) that they themselves committed the violations described in the situations when they were riding their bike (cyclists) or driving their car (car drivers). Not signalling was the violation most frequently recorded by the total participants and Failing to yield was the least frequent (see Table 4.7).

Table 4.7 Self-reported frequency of committing the six risky behaviours

Risky behaviour	All participants (n=595)	
	Mean	S.D
Failing to yield	1.42	0.60
Going through a red light	1.45	0.71
Not signalling when turning	2.25	1.00
Swerving	1.44	0.60
Tailgating	1.81	0.74
Not checking traffic	1.44	0.70
Total	1.64	0.41

There was no difference in frequency of Failure to yield between driver and cyclists, however, there was significant difference between drivers and cyclists for the other five situations. Cyclists report a significantly higher violation frequency for Going through a red light and Not signaling when turning whereas, drivers reported a significantly higher violation frequency for Swerving, Tailgating and Not checking traffic (see Table 4.8). Tailgating was reported by drivers as the traffic violation they most frequently performed and cyclists recorded Not signaling when turning (see Table 4.8).

The only difference for gender appears to be for tailgating ($p= <.001$) where males cyclists record significantly higher frequency of violation than female cyclists (see Table 4.8). Both male and female cyclists reported Not signalling when turning (m= 2.50 and m=2.39) followed by Tailgating (m=1.56 and m=1.85) as the most frequent traffic violations they performed and Not checking traffic (m=1.38 and m= 1.29) as the least frequent. For cyclists in Queensland Not signalling when turning left is not a traffic violation (s48, s49, s50) as cyclists are only required to signal when turning right (Department of Transport and Main Roads, 2014). Both male and female drivers recorded Tailgating the vehicle in front as the most frequent violation they carried out (m=1.98 and m=1.98) and Going through a red light as the least frequent (m=1.29 and m=1.33). Across all six situations, female cyclists reported less frequently committing traffic violations than male cyclists (Table 4.8). Female drivers reported a higher frequency of Going through a red light (m=1.33) and Swerving (m=1.57) than male drivers (m=1.29 and m=1.48).

Self-reported frequency of engagement in violations was correlated with other factors (Table 3.7). The frequency of violations decreased with increased age ($r=-.134$, $p<.001$) and increased with greater monthly use ($r=.110$, $p<.01$) and higher Incompetence scores ($r=.307$, $p<.001$). The frequency of violations decreased with higher Control scores ($r=-.120$, $p<.01$).

Table 4.8 Self-reported frequency of committing traffic rule violations by female and male cyclists and drivers

Situation	Cyclist (n=444)		Driver (n=151)		T-Test
	Mean	S.D	Mean	S.D	
Failing to yield	1.40	0.62	1.47	1.45	*t* (593) = -1.31, p = .190
Going through a red light	1.49	0.76	1.31	2.25	*t* (593) = 2.71, p = .007
Not signalling when turning	2.47	1.01	1.63	1.44	*t* (593) = 9.57, p < .001
Swerving	1.41	0.59	1.54	1.81	*t* (593) = -2.24, p = .025
Tailgating	1.76	0.73	1.98	1.44	*t* (593) = -3.14, p = .002
Not checking traffic	1.35	0.63	1.72	1.64	*t* (593) = -5.70, p <.001
Cyclist	**Female (n=140)**		**Male (n=304)**		**T-Test**
	Mean	S.D	Mean	S.D	
Failing to yield	1.35	0.60	1.42	0.63	*t* (442) = -1.07, p = .285
Going through a red light	1.47	0.67	1.50	0.80	*t* (442) = -0.41, p = .683
Not signalling when turning	2.39	1.03	2.50	1.00	*t* (442) = -1.14, p = .253
Swerving	1.38	0.53	1.42	0.61	*t* (442) = -0.76, p = .447
Tailgating	1.56	0.64	1.85	0.75	*t* (442) = -3.94, p = <.001
Not checking traffic	1.29	0.54	1.38	0.65	*t* (442) = -1.30, p = .196
Driver	**Female (n=95)**		**Male (n=56)**		**T-Test**
	Mean	S.D	Mean	S.D	
Failing to yield	1.44	0.54	1.52	0.50	*t* (149) = -0.85, p = .395
Going through a red light	1.33	0.57	1.29	0.49	*t* (149) = 0.44, p = .659
Not signalling when turning	1.62	0.67	1.64	0.62	*t* (149) = -0.20, p = .843
Swerving	1.57	0.65	1.48	0.60	*t* (149) = -0.81, p = .418
Tailgating	1.98	0.84	1.98	0.65	*t* (149) = -0.11, p = .917
Not checking traffic	1.69	0.84	1.75	0.84	*t* (149) = -0.39, p = .696

4.6 Perceived skill

To measure the level of perceived skill participants rated their level of agreement with 17 different statements that Chaurand and Delhomme (2013) identified as measuring three subscales termed perceived Control, Overconfidence and Incompetence on a five point scale from 1 = Not at all to 5 = Completely. Table 4.9 shows that cyclists rated themselves significantly more highly than drivers on perceived Control (m=3.75 vs. m=3.60, t (593)=3.03, p=.003) and Overconfidence (m=3.74 vs. m=3.43, t (593)= 5.50, p<.001) and significantly lower than drivers on Incompetence (m=1.96 vs. m=2.19, t (593)=4.97, p<.001). In a similar vein, males rated themselves significantly more highly than females on perceived Control (m=3.81 vs. m=3.59, t (593)=4.53, p<.001) and Overconfidence (m=3.78 vs. m=3.48, t (593)= 5.96, p<.001) and significantly lower than females on Incompetence (m=1.94 vs. m=2.14, t (593)=4.71, p<.001) (see Table 4.10).

Table 4.9 Cyclist and driver mean ratings on perceived skill subscales of perceived Control, Overconfidence and Incompetence

	Cyclist (n=444)		Driver (n=151)		
	Mean	SD	Mean	SD	Statistical test
Control	3.75	0.59	3.60	0.51	t(593)=3.03, p=.003
Overconfidence	3.74	0.60	3.43	0.60	t(593)= 5.50, p=.001
Incompetence	1.96	0.51	2.19	0.48	t(593)= 4.97, p=.001

1= low 5= high

Table 4.10 Female and male mean ratings on perceived skill subscales of perceived Control, Overconfidence and Incompetence

	Female (n=235)		Male (n=360)		
	Mean	SD	Mean	SD	Statistical test
Control	3.59	0.57	3.81	0.56	t(593)=4.53, p<.001
Overconfidence	3.48	0.63	3.78	0.58	t(593)=5.96, p<.001
Incompetence	2.14	0.50	1.94	0.50	t(593)=4.71, p<.001

1= low to 5= high

The patterns in the ratings on the perceived skill subscales remained when both type of participant and gender were considered. Male cyclists and drivers recorded higher levels of perceived Control than female cyclists and drivers respectively. There was a statistically significant association for the perceived skill sub scales between male or female cyclists rating of Overconfidence ($p<.001$), Control ($p<.001$), and Incompetence ($p<.001$) (see Table 4.11). There was no significant statistical association between gender and skill subscales for drivers. Higher levels of perceived Control, Overconfidence and lower levels of Incompetence were linked to the greater time spent travelling and higher frequency of monthly use (see Appendix B, Figures 6,7,8).

Table 4.11 Female and male cyclist and driver mean ratings on perceived skill subscales of perceived Control, Overconfidence and Incompetence

	Female cyclist (n=140)		Male cyclist (n=304)		Female driver (n=95)		Male driver (n=56)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Control	3.62	0.60	3.83	0.58	3.55	0.53	3.68	0.48
Overconfidence	3.55	0.62	3.83	0.58	3.38	0.63	3.51	0.53
Incompetence	2.06	0.50	1.91	0.50	2.24	0.48	2.10	0.45

	Total participants One-way ANOVA	Male and female cyclists T test	Male and female drivers T test
Control	$F(3, 591)=8.28$, $p<.001$	$t(442)=-3.61$, $p<.001$	$t(149)=-1.40$, $p=.163$
Overconfidence	$F(3, 591)=19.08$, $p<.001$	$t(442)=-4.66$, $p<.001$	$t(149)=-1.31$, $p=.191$
Incompetence	$F(3, 591)=12.48$, $p<.001$	$t(442)=3.02$, $p<.001$	$t(149)=1.79$, $p=.075$

1= low to 5= high

4.7 Levels of perceived risk

Perceived risk was measured by items asking participants to rate their likelihood of being involved in an accident in the next three years if they were involved in that particular scenario from 1=Very unlikely to 5=Very likely. In this section, the mean risk ratings are presented as a function of Gender, Participant type (cyclist or driver), Situation and Configuration (interacting vehicle as bicycle or car). The following sections examine the results of the statistical analyses of the data.

Table 4.12 shows a general pattern of higher risk ratings by females than males. The mean risk ratings were similar for female cyclists and drivers (3.51 and 3.53, respectively) and similar for male cyclists and drivers (3.16 and 3.25).

Table 4.12 Mean risk ratings by gender and participant type

Gender	Cyclist		Driver		Total	
	Mean	SD	Mean	SD	Mean	SD
Female	3.51	0.61	3.56	0.67	3.53	0.64
Male	3.16	0.78	3.25	0.85	3.17	0.79
All	3.27	0.75	3.45	0.75	3.32	0.75

1= low risk to 5= high risk

The mean ratings of perceived risk are summarised in Table 4.13 for each of the six situations and three Configurations (interact with a bike, interact with a car, and participant responsible for the violation). As mentioned in Section 3.4.2, analyses were unable to be conducted on mean risk ratings for the participant responsible Configuration because of bimodality in some of the data. For this reason, the means are presented separately for the two Configurations (interact with a bike, interact with a car) as well as all three Configurations.

The mean risk ratings were highest for Tailgating and lowest for Not signalling when turning. The mean risk ratings appeared lower for cyclists than drivers when the interacting vehicle was a bicycle. When the interacting vehicle was a car, cyclists appeared to perceive higher levels of risk than drivers for Failing to yield, Going through a red light and Not signalling when turning.

Table 4.13 Cyclist and driver mean risk ratings for each of the situations and Configurations

Situation	Interact with bike		Interact with car		Bike or car		Participant responsible		All Configurations	
Cyclist (n=444)	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Failing to yield	2.38	1.12	3.85	1.01	3.11	0.89	3.46	1.41	3.23	0.89
Going through a red light	2.71	1.19	3.92	1.17	3.31	1.02	3.36	1.60	3.28	0.97
Not signalling when turning	2.57	1.03	3.43	1.06	3.00	0.89	2.79	1.18	2.93	0.84
Swerving	2.65	1.09	3.40	1.13	3.06	0.97	3.48	1.38	3.20	0.97
Tailgating	3.53	1.00	3.96	1.06	3.75	0.93	3.41	1.27	3.63	0.95
Not checking traffic	3.11	1.14	3.67	1.28	3.39	1.13	3.77	1.27	3.51	1.10
Total	2.83	0.80	3.71	0.83	3.31	0.82	3.38	1.12	3.31	0.82
Driver (n=151)										
Failing to yield	3.04	1.13	3.10	1.12	3.07	1.04	3.26	1.22	3.13	0.91
Going through a red light	3.37	1.12	3.71	1.08	3.53	0.99	3.47	1.12	3.52	0.99
Not signalling when turning	2.85	1.11	3.02	1.05	2.93	0.96	3.15	1.24	3.00	0.86
Swerving	3.45	1.14	3.56	1.06	3.50	1.03	3.46	1.18	3.49	0.98
Tailgating	3.76	1.10	4.05	0.89	3.91	0.89	3.56	1.19	3.79	0.94
Not checking traffic	3.68	1.17	3.78	1.12	3.73	1.11	3.64	1.16	3.70	1.09
Total	3.36	0.81	3.54	0.76	3.42	0.76	3.42	0.76	3.42	0.76
All (n=595)										
Failing to yield	2.55	1.15	3.51	1.09	3.11	0.93	3.41	1.37	3.21	0.91
Going through a red light	2.86	1.20	3.64	1.14	3.37	1.01	3.46	1.41	3.34	0.99
Not signalling when turning	2.66	1.06	3.07	1.07	2.93	0.91	2.89	1.20	2.95	0.86
Swerving	2.84	1.15	3.49	1.11	3.17	1.00	3.48	1.33	3.27	0.98
Tailgating	3.56	1.01	3.76	1.02	3.79	0.92	3.44	1.25	3.67	0.94
Not checking traffic	3.24	1.18	3.73	1.24	3.47	1.14	3.74	1.24	3.56	1.09
Total	2.96	0.84	3.67	0.82	3.14	0.78	3.41	1.37	3.33	0.81

1= low risk to 5= high risk

4.8 Analyses of variance of risk ratings

An analysis of variance of the risk ratings was conducted with Configuration (interacting vehicle either car or bicycle) and Situation (the six interactions) as within-subjects variables and Gender, Age group, Participant type (cyclist or driver), experience (Time spent per week, frequency of use per week and monthly use), the three perceived skill subscales and violation score as between-subjects variables. The results are summarised in Tables 4.14 and 4.15 (full results are in Appendix C). The analyses were then repeated separately for each situation (see Table 4.16). Where the results are described below, the significance after the Greenhouse-Geisser correction is adopted.

Among the within-subjects factors, there was no significant effect of Configuration (F (1) =.09, p=.759) or Situation (F (4.6) =1.37, p=.234). There was an interaction between these two variables (F (5) =2.40, p=.040) and further three-way interactions among Incompetence (F (4.60) =3.24, p=.006) and Participant type (F (4.60) =9.21, p<.001) and Gender (F (4.60) =2.55, p=.030). However, there were significant interactions between Configuration and Overconfidence (F (1) 10.10, p=.002), and Configuration and Participant type (F (1) =18.01, p<.001). In addition, there were interactions between Situation and Participant type (F (1) =4.66, p<.001).

Table 4.14 Tests of within-subject effects for overall ANOVA of risk ratings

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Configuration	Sphericity Assumed	0.103	1	0.103	0.09	.759	.000
	Greenhouse -Geisser	0.103	1	0.103	0.09	.759	.000
Configuration x Overconfidence	Sphericity Assumed	11.039	1	11.039	10.10	.002	.018
	Greenhouse -Geisser	11.039	1	11.039	10.10	.002	.018
Configuration x Driver Cyclist	Sphericity Assumed	19.672	1	19.672	18.01	.000	.031
	Greenhouse -Geisser	19.672	1	19.672	18.01	.000	.031
Situation x Driver Cyclist	Sphericity Assumed	22.446	5	4.489	4.66	.000	.008
	Greenhouse -Geisser	22.446	4.566	4.916	4.66	.000	.008
Configuration x Situation	Sphericity Assumed	4.405	5	0.881	2.40	.035	.004
	Greenhouse -Geisser	4.405	4.601	0.957	2.40	.040	.004
Configuration x Situation x Incompetence	Sphericity Assumed	5.955	5	1.191	3.24	.006	.006
	Greenhouse -Geisser	5.955	4.601	1.294	3.24	.008	.006
Configuration x Situation x Gender	Sphericity Assumed	4.687	5	0.937	2.55	.026	.005
	Greenhouse -Geisser	4.687	4.601	1.019	2.55	.030	.005
Configuration x Situation x Driver Cyclist	Sphericity Assumed	16.916	5	3.383	9.21	.000	.016
	Greenhouse -Geisser	16.916	4.601	3.676	9.21	.000	.016

Among the between-subjects factors, (Table 4.15) there were significant main effects between risk rating and Participant type (F(1)=5.06, p=.025), Gender (F(1)=5.58, p=.019), Age group (F(5)=2.56, p=.027), Time spent per week (F(1)=4.69, p=.031) perceived Control (F(1)=6.57, p=.011, perceived Incompetence (F(1)13.26, p<.001) self reported violations (F(1)=4.99, p=.026), and a trend towards Frequency of use to be significant, p=.051). There was no significant effect for Overconfidence. As Table 4.15 shows the interactions between Gender and Participant type, Gender and Age Group, Participant type and Age group, and the threeway interaction Participant type, Gender and Age group were not significant. The relevance of these non significant findings is discussed in Sections 5.3 and 5.4.

Table 4.15 Results of between subject-effects ANOVA of risk ratings

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	602.342	1	602.34	98.80	.000	.149
Weekly time	28.594	1	28.59	4.69	.031	.008
Monthly use	22.436	1	22.44	3.68	.056	.006
Violation	30.432	1	30.43	4.99	.026	.009
Control	40.021	1	40.02	6.56	.011	.011
Overconfidence	18.502	1	18.50	3.03	.082	.005
Incompetence	80.85	1	80.85	13.26	.000	.023
Gender	34.015	1	34.02	5.58	.019	.010
Driver or Cyclist	33.928	1	33.93	2.55	.026	.009
Age group	77.932	5	15.59	2.56	.027	.022
Gender x Driver or Cyclist	0.291	1	0.29	0.05	.827	.000
Gender x Age group	27.907	5	5.58	0.90	.470	.008
Driver or Cyclist x Age group	47.472	5	9.49	1.56	.170	.014
Driver or Cyclist x Gender x Age group	18.790	5	3.76	0.62	.687	.005
Error	3438.75	564	6.10			

Table 4.16 summarises the results of the ANOVAs that were conducted separately for each of the six situations. The p values are presented in the table here to provide an indication of the significant main effects and interactions. The full results of the analyses are presented in Appendix C, Tables 8, 11, 14, 17, 20 and 23. There was no significant overall effect of the Configuration (type interacting vehicle bicycle or a car) on the individual situations with the exception of Failing to yield, where the perceived risk rated by cyclists was significantly lower when a bike Failed to yield than for a car. Whether the participant was a cyclist or a driver was associated with the situations Fail to yield, Going through a red light and Not

checking traffic. Across all six situations the participant's level of Incompetence had a significant effect. Control was significantly associated with the situations Fail to yield, Tailgating and Not checking traffic and Overconfidence with Going through a red light and Tailgating. The age group of the participant was significantly associated with Going through a red light, Tailgating and Not checking traffic.

Table 4.16 Summary of significance levels for within-subjects comparisons in ANOVAs conducted separately for each situation

	Failing to yield	Going through a red light	Not signalling when turning	Swerv-ing	Tail-gating	Not checking traffic
Configuration	**.009**	.841	.849	.838	.142	.893
Configuration x Driver Cyclist	**.000**	**.008**	.150	.191	.772	**.031**
Configuration x Gender	.237	.202	.064	.334	.460	.316
Configuration x weekly time	.848	.709	.978	**.001**	.611	.650
Configuration x monthly use	.237	.876	.784	.064	.812	.371
Configuration x violations	.360	.775	.304	**.037**	.572	.594
Configuration x Control	.204	.986	.823	.355	.976	.534
Configuration x Overconfidence	**.032**	**.020**	.289	**.031**	**.035**	.086
Configuration x Incompetence	**.000**	.439	.326	.970	.826	.598
Configuration x Age group x Driver Cyclist	.302	.227	**.022**	.112	.836	.284
Driver cyclist	.892	**.019**	.441	**.002**	**.004**	**.032**
Age group	.077	**.003**	.836	.689	**.048**	**.028**
Gender	.413	.114	**.004**	.052	**.037**	.167
Weekly time	**.035**	.069	.216	**.039**	**.046**	.482
Monthly use	.081	.455	**.032**	.329	.372	**.029**
Violations	**.014**	**.032**	.489	.099	**.045**	.171
Control	**.005**	.100	.255	.193	**.025**	**.019**
Overconfidence	.226	**.033**	.928	.789	**.010**	.120
Incompetence	**.001**	**.002**	**.002**	**.005**	**.032**	**.029**
Age group x Gender	**.046**	.463	.215	.704	.066	.668

4.9 Effects of gender on perceived risk

The between-subjects ANOVA showed that overall, females gave higher ratings of perceived risk than males (3.56 versus 3.18, F (1)=5.58, p=.019). For every situation female cyclists and drivers rated the risk higher regardless of whether the interacting vehicle was a car or a bike. There were no significant interactions between Gender and Participant type or Gender and Age group, suggesting that the gender differences are consistent across cyclists and drivers and do not vary with age.

Gender was also involved in a three-way interaction with Configuration and Situation. Examination of the mean risk ratings in Table 4.17 suggests that this may reflect similar risk ratings by females and males (M=3.63and m= 3.68 respectively) when the scenario involves a car Failing to yield, and possibly also Not signalling when turning (m=3.40and m=3.28 respectively). This is somewhat supported by the separate ANOVAs for each situation which showed the Configuration by Gender interaction approaches significance only for Not signalling when turning (p=.064).

Table 4.17 Male and female risk ratings by interacting vehicle and situation

Situation	Interaction with Bike				Interaction with Car				Both configurations			
	Female	SD	Male	SD	Female	SD	Male	SD	Female	SD	Male	SD
Failing to yield	2.77	1.11	2.40	1.16	3.63	1.10	3.68	1.08	3.20	0.92	3.04	0.92
Going through a red light	3.24	1.14	2.64	1.18	4.10	1.00	3.70	1.21	3.67	0.92	3.17	1.02
Not signalling when turning	2.95	1.02	2.44	1.04	3.40	0.99	3.28	1.11	3.17	0.85	2.86	0.93
Swerving	3.11	1.13	2.69	1.13	3.64	1.00	3.39	1.17	3.37	0.95	3.04	1.01
Tailgating	3.81	0.90	3.44	1.05	4.17	0.85	3.86	1.09	3.99	0.78	3.65	0.97
Not checking traffic	3.57	1.10	3.06	1.18	3.99	1.05	3.49	1.32	3.78	1.01	3.28	1.18

1= low risk to 5= high risk

While there was no significant Gender by Situation interaction in the overall ANOVA, the separate ANOVAs for each situation showed a significant main effect of gender only for Not signalling when turning (p=.004) and Tailgating (p=.037) and approached significance for Swerving (p=.052) (see Table 4.16). Independent t-test show gender had a significant effect for the mean risk rating of Not signalling when turning for both cyclist and drivers. The mean risk rating for Tailgating had a significant effect of gender for cyclists only (Table 4.18). Independent t-tests between male and female drivers showed the significant effect of gender on risk rating for three of the situations Going through a red light (p=.019), Not signalling when turning (p=.002) and Not checking traffic (p=.027) (Table 4.18). Independent t-tests between male and female cyclists showed significant effect of gender for the mean risk rating for each of the six situations (Table 4.18).

Table 4.18 Male and female cyclists and driver mean risk rating and t-tests

	Female cyclist	SD	Male cyclist	SD	T-test
Failing to yield	3.26	0.87	3.05	0.89	t (442) = 2.27, p = .024
Going through a red light	3.66	0.89	3.15	1.01	t (442) = 5.07, p < .001
Not signalling when turning	3.21	0.83	2.90	0.91	t (442) = 3.35, p = .001
Swerving	3.23	0.89	2.98	0.99	t (442) = 2.55, p = .011
Tailgating	4.00	0.78	3.63	0.97	t (442) = 3.99, p < .001
Not checking traffic	3.71	0.96	3.24	1.18	t (442) = 4.09, p <.001
	Female driver	**SD**	**Male driver**	**SD**	**T-test**
Failing to yield	3.12	1.00	2.98	1.09	t (149) = 0.79, p = .428
Going through a red light	3.68	0.90	3.29	1.09	t (149) = 2.37, p = .019
Not signalling when turning	3.12	0.89	2.62	1.00	t (149) = 3.22, p = .002
Swerving	3.59	1.00	3.36	1.06	t (149) = 1.35, p = .180
Tailgating	3.98	0.83	3.79	0.97	t (149) = 1.30, p = .196
Not checking traffic	3.88	1.07	3.47	1.13	t (149) = 2.23, p = .027

1= low risk to 5= high risk

4.10 Effects of type of participant on perceived risk

The analysis across all situations showed a significant main effect of type of participant, reflecting the higher mean risk ratings by drivers than cyclists (3.41 versus 3.30). The separate ANOVAs for each situation revealed that this significant main effect was found for all situations except Failing to yield (p=.892) and Not signalling when turning (p=.441).

The level of risk rated by the participant (cyclist or driver) was significantly associated with the type of vehicle (bicycle or car) engaged in the violation, and also a two-way interaction between the type of interacting vehicle and situation. The mean risk ratings relevant to these interactions are presented in Table 4.13. The two-way interaction appears to reflect cyclists perceiving the risk of interacting with another bike to be much lower than interacting with a car (2.83 versus 3.71), while the risks of interacting with a bike and a car are perceived to be similar by drivers (3.36 versus 3.54). Inspection of the means suggests that the three-way interaction may reflect cyclists rating the risk of Tailgating similar for interactions with another bike or a car. However, the separate ANOVAs for each situation show that the type of participant by type of interacting vehicle is significant for Failing to yield, Going through a red light, and Not checking traffic only.

4.11 Effects of type of interacting vehicle (Configuration) on perceived risk

The analysis across all situations (Table 4.14) showed no significant overall difference in perceived risk according to whether the interacting vehicle was a bicycle or a car, but this variable was involved in a number of interactions. The analyses for individual situations showed a main effect of type of interacting vehicle (Configuration) only for Failing to yield (Table 4.16). As noted in the previous section, type of interacting vehicle was also involved in significant interactions with type of participant (cyclist or driver) and type of participant and situation.

4.12 Effects of situation on perceived risk

There was no overall effect of type of situation on perceived risk but cyclists and drivers perceived different levels of risk for different situations (see Table 4.13). The general pattern of drivers reporting higher levels of risk was absent for Failing to yield (cyclists m=3.12, drivers m=3.07) and Not signalling when turning (cyclists m=3.00, drivers m=2.93).

4.13 Effects of perceived skill on perceived risk

The overall ANOVA showed significant main effects of the perceived skill subscales of perceived Control ($p=.011$) and Incompetence ($p<.001$) but only a trend towards a main effect of Overconfidence ($p=.086$). Inspection of the scatterplots (Appendix B, Figure 3) shows that higher levels of perceived Control were associated with lower levels of perceived risk and higher levels of Incompetence were associated with higher levels of perceived risk. In addition, the bivariate correlations between each of the perceived skill subscales and risk ratings in Table 3.8 show a general pattern of negative relationships between perceived Control and perceived risk and positive relationships between Incompetence and perceived risk. The pattern is less clear for Overconfidence.

There was an interaction between Configuration and Overconfidence, in which the effect of Overconfidence on risk ratings was different when the interacting vehicle was a car compared to a bike. Inspection of the scatterplots (Appendix B, Figure 3) shows that when the interaction involved a bike, cyclists with high levels of Overconfidence recorded lower levels of risk than drivers with high levels of Overconfidence. However, when the interaction involved a car, cyclists with high levels of Overconfidence demonstrated higher perceived risk than drivers with high levels of Overconfidence.

There was an additional interaction between Incompetence and Configuration and Situation. The separate ANOVAs for each situation showed that the interaction between Incompetence and Configuration was only significant for Failing to yield.

4.14 Effects of amount of experience on perceived risk

Age (as a proxy for length of time driving licence was held), monthly frequency and weekly time spent cycling or riding and distance of riding/driving were the measures of amount of experience examined.

There was a significant main effect of Age group in the between subject-effects ANOVA of risk rating ($F(1)=5.58$, p=.019). The level of risk rated decreased with increased age for Failing to yield and Going through a red light, with the lowest level of risk rating by the 70-79 Age group (see Table 4.19).

Table 4.19 Mean risk rating for each Age group

Age group	Failing to Yield		Going through a red light		Not signalling		Swerving		Tailgating		Not checking traffic	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20 - 29	3.44	0.85	3.48	0.86	3.06	0.80	3.38	0.78	3.97	0.77	3.73	0.89
30 - 39	3.22	0.85	3.40	0.93	2.90	0.85	3.28	0.96	3.68	0.86	3.55	1.08
40 - 49	3.20	0.88	3.31	0.99	2.93	0.83	3.24	0.99	3.69	0.99	3.59	1.04
50 - 59	3.21	0.96	3.33	1.04	2.97	0.88	3.26	1.01	3.57	0.94	3.56	1.14
60 - 69	3.11	1.01	3.36	1.05	3.02	0.88	3.38	1.09	3.73	1.08	3.53	1.24
70 -79	2.33	0.60	2.33	0.83	2.39	1.05	2.67	1.14	2.94	0.93	2.52	1.39
Total	3.21	0.91	3.34	0.99	2.95	0.86	3.27	0.98	3.67	0.94	3.56	1.09

1= low risk to 5= high risk

There was a significant interaction between Age group and Gender in the overall between subjects-effects ANOVA of risk ratings ($F(5)=0.90$, p=.470). Females consistently rated the level of risk higher than males across the majority of Age groups. The overall trend of decreasing levels of perceived risk with increased age was uniform for both males and females (see Table 4.20) regardless of whether they were a cyclist or driver (see Appendix B, Table B 14).

Table 4.20 Male and female mean risk rating for each Age group

	N	Failing to Yield	Going through a red light	Not signalling	Swerving	Tailgating	Not checking traffic
20 - 29 male	40	3.24	3.49	2.90	3.14	4.04	3.54
SD		0.76	0.79	0.78	0.79	0.83	0.91
20 - 29 female	29	3.47	3.69	3.26	3.33	4.05	3.83
SD		0.97	0.923	0.83	0.75	0.70	0.85
30 - 39 male	72	3.02	3.17	2.79	2.90	3.60	3.16
SD		0.89	1.00	0.84	0.99	0.89	1.17
30 - 39 female	56	3.17	3.63	3.11	3.32	4.05	3.84
SD		0.79	0.77	0.80	0.87	0.72	0.80
40 - 49 male	95	2.97	3.05	2.79	2.94	3.57	3.26
SD		0.96	1.03	0.85	1.08	1.02	1.11
40 - 49 female	61	3.16	3.79	3.22	3.43	4.05	3.85
SD		0.74	0.78	0.71	0.74	0.84	0.81
50 - 59 male	114	3.12	3.30	2.98	3.17	3.68	3.32
SD		0.93	1.05	0.89	1.01	0.98	1.18
50 - 59 female	61	3.18	3.66	3.16	3.30	3.80	3.73
SD		1.00	0.98	0.86	1.00	0.86	1.02
60 - 69 male	33	2.85	2.85	2.85	3.08	3.58	3.20
SD		1.06	1.11	0.87	1.07	1.09	1.27
60 - 69 female	23	3.35	3.76	3.17	3.70	4.20	3.85
SD		0.87	0.83	0.89	1.06	0.94	1.16
70 -79 male	7	2.50	2.57	2.29	2.71	3.14	2.64
SD		0.72	0.96	1.05	1.22	1.07	1.24
70 -79 female	4	2.38	2.00	3.13	3.13	3.63	2.25
SD		0.17	0.57	1.04	1.15	0.69	1.83
Total	595	3.11	3.37	2.98	3.17	3.79	3.47
SD		0.91	0.99	0.86	0.98	0.94	1.09

1= low risk to 5= high risk

There was a significant main effect of time spent cycling/driving per week. The mean risk ratings in Table 4.21suggest that participants who recorded travelling less than 30 minutes per week and those who recorded travelling 15 hours or more per week perceived lower levels of risk than other participants.

Table 4.21 Mean risk ratings as a function of amount of time spent cycling/driving in a week

Time spent riding or driving each week	Mean	N	SD
Less than 30 min	3.13	8	0.60
Between 30 min and less than 2 hours	3.36	70	0.78
Between 2 hours and less than 5 hours	3.27	176	0.74
Between 5 hours and 10 hours	3.34	217	0.77
Between 10 and 15 hours	3.39	94	0.75
15 hours or more	3.09	29	0.68
Total	3.31	594	0.75

1= low risk to 5= high risk

The main effect of frequency of use of a bicycle on perceived risk approached significance (p=.051). Table B15 shows that perceived risk was highest for those who reported 'Never' riding a bicycle (m=3.61), which is consistent with the higher risk ratings of drivers than cyclists because this variable was used to assign participants to the cyclist or driver group.

4.15 Effects of past violations on perceived risk

Participants were asked to report the frequency they themselves carried out each of the risky behaviours when travelling. The ANOVA of risk ratings (Table 4.15) showed a significant main effect of violation score. Examination of the bivariate correlations (Table 3.8) shows that there was a pattern of negative, but non-significant correlations between violation score and perceived risk. The scatterplots in Appendix B (Figure B9) suggest that the negative relationship appears to be present for cyclists, but not for drivers. The plots suggest a positive relationship between past violations and perceived risk for male drivers. Unfortunately, this is unable to be confirmed because no interactions between violation score and other variables were permitted by the design of the ANOVAs.

4.16 Effects of degree of Control (responsibility for the violation) on perceived risk

Participants were asked to identify how likely it was a situation would result in an accident if they were the road user who violated one of the road rules. As noted in Section 3.4.2, preliminary analyses identified that the distributions of risk ratings were bimodal for some of the items where the participant was asked to imagine they were the person committing the violation. For this reason ANOVAs could not be used to compare mean risk ratings between items where the participant was committing the violation and items where another cyclist or another driver was committing the violation. Instead, the ratings were re-coded as binary variables (likely/very likely versus other) and non-parametric tests were used.

Cochran's Q test was performed to measure whether any of the percentages likely/very likely varied among the 12 items (six situations x responsible/not responsible). For the cyclists and the drivers, both tests showed that the percentages were not equal among the 12 items (both $p<.001$). Following this overall test, McNemar's Chi-square test was used to assess whether the percentages of respondents rating the risk as likely/very likely varied according to whether the road user themselves was responsible for the violation, or the other road user.

Table 4.21 below shows that the percentage of cyclists who rated the risk as likely/very likely was significantly lower when they were responsible than when a driver was responsible for Failing to yield, Going through a red light and Not signalling. For the same three situations, the percentage of drivers who rated the risk as likely/very likely was significantly higher when they were responsible than when a cyclist was responsible. For Swerving and Tailgating, more cyclists gave higher ratings of risk when they were responsible than when drivers were responsible. Both drivers and cyclists viewed the same high level of risk if they or the other road user were the one responsible for Not checking traffic.

Table 4.22 Numbers and percentages of cyclists and drivers who rated the likelihood of an accident as likely or very likely as a function of responsibility for road rule violation
Significance level of McNemar's test included

Situation	Cyclist (n=444)			Driver (n=151)		
	Participant (Cyclist) responsible	Other (Driver) responsible	Sig	Participant (Driver) responsible	Other (Cyclist) responsible	Sig
Failing to yield	269 (60.6%)	323 (72.7%)	**.001**	87 (57.6%)	66 (43.7%)	**.001**
Going through a red light	263 (59.2%)	323 (72.7%)	**.001**	101 (66.9%)	79 (52.3%)	**.002**
Not signalling when turning	148 (33.3%)	244 (55.0%)	**.001**	74 (49.0%)	53 (35.1%)	**.003**
Swerving	271 (61.0%)	244 (55.0%)	**.024**	94 (62.3%)	93 (61.6%)	1.000
Tailgating	340 (76.6%)	258 (58.1%)	**.001**	99 (65.6%)	107 (70.9%)	.256
Not checking traffic	312 (70.3%)	298 (67.1%)	.131	98 (64.9%)	97 (64.2%)	1.000

Table 4.22 demonstrates an overall pattern of females perceiving higher levels of risk than males when the participant was the one who committed the violation. McNemar's test of the relationship between gender and the perceived risk when a participant carried out the risky behaviour showed a significant difference for Not signalling when turning ($p<.001$) and Not checking traffic ($p=.005$). The statistically significant effect of gender was evident within the cyclist and driver road user groups for all six situations, where a higher percentage of female participants perceived an accident was likely or very likely if they violated the road rule (Table 4.22).

Table 4.23	Numbers and percentages of female and male cyclists and drivers who rated the likelihood of an accident as likely or very likely when responsible for road rule violation

Cyclists (n=444)	Female (n=140)	Male (n=304)	McNemar's Test
Failing to yield	98 (70.0%)	171 (56.3%)	**.025**
Going through a red light	96 (68.6%)	167 (54.9%)	**.009**
Not signalling with turning	55 (39.3%)	93 (30.6%)	**.000**
Swerving	101 (72.1%)	170 (55.9%)	**.037**
Tailgating	97 (69.2%)	161 (53.0%)	**.004**
Not checking traffic	116 (82.9%)	196 (64.5%)	.640
Driver (n=151)	(n=95)	(n=56)	
Failing to yield	59 (62.1%)	28 (50.0%)	**.001**
Going through a red light	67 (70.6%)	34 (60.8%)	**.000**
Not signalling with turning	50 (52.6%)	24 (42.8%)	.060
Swerving	62 (65.3%)	32 (57.2%)	**.000**
Tailgating	71 (74.8%)	28 (50.0%)	**.000**
Not checking traffic	65 (68.4%)	33 (58.9%)	**.000**
Total (n=595)	(n=235)	(n=360)	
Failing to yield	157 (66.8%)	199 (55.2%)	.866
Going through a red light	163 (69.3%)	201 (55.8%)	.867
Not signalling with turning	105 (44.7%)	117 (32.5%)	**.000**
Swerving	163 (69.4%)	202 (56.1%)	.823
Tailgating	168 (71.5%)	189 (52.5%)	.914
Not checking traffic	181 (77.0%)	229 (63.6%)	**.005**

4.17 Summary

This chapter began by presenting the demographic characteristics of the respondents. There were more cyclists than drivers and relatively fewer female cyclists than female drivers. The cyclists were younger on average than the drivers, but the age distributions of male and female participants were similar. The cyclists spent more time riding than the drivers spent driving with over half of both male and female cyclists reporting riding more than four times per week. Male cyclists rode a greater distance but spent the same time riding as females. Male drivers drove more frequently and spent more time driving than females.

Cyclists were more likely than drivers to report being involved in an accident in the past three years but there were no gender differences in crash involvement for cyclists or drivers. Cyclists reported higher frequency of participation in the traffic violations of Going through a red light and Not signalling when turning than drivers and drivers reported more frequently engaging in Tailgating and Not checking traffic than cyclists. In Queensland under the road rules (s48, s49, s50) Not signalling when turning to the left is not a traffic violation as cyclists are only required to signal when turning to the right.

In terms of perceived skill, cyclists and males rated themselves higher on perceived Control and Overconfidence and lower on Incompetence.

The results related to each of the specific research questions were then presented. Females gave higher ratings of perceived risk than males, a finding which was consistent across cyclists and drivers and across Age groups. The effect of gender was absent for Failing to yield and Not signalling when turning where males and females gave similar risk ratings.

Cyclists recorded a lower level of perceived risk than drivers. However, the effect differed according to the type of interacting vehicle. Cyclists perceived the risk of interacting with another bike to be much lower than interacting with a car, while drivers perceived similar levels of risks for interacting with a bike and a car. However, this pattern varied somewhat across the six situations.

There was no significant overall difference in the risk perceived in interactions with a bicycle versus interactions with a car, with an effect only being found for Failing to yield. Similarly, there was no overall difference in the levels of risk perceived for the six situations but the general pattern of drivers reporting higher levels of risk than cyclists was absent for Failing to yield and Not signalling when turning.

Amount of experience was measured by age (as a proxy for length of time driving licence was held), monthly frequency and weekly time spent cycling or riding, and distance ridden or driven. Mean risk ratings decreased as the age of the participant increased; the lowest level of perceived risk was recorded by both males and females in the 70-79 age group. There was a significant main effect for the amount of time spent cycling/driving per week on perceived risk, with participants who recorded travelling less than 30 minutes per week and those who recorded travelling 15 hours or more per week perceiving lower levels of risk. The main effect of monthly frequency of bicycle use on perceived risk approached significance ($p=.051$). Perceived risk was highest for those who reported ‘Never’ riding a bicycle.

Higher levels of perceived Control were associated with lower levels of perceived risk and higher levels of Incompetence were associated with higher levels of perceived risk. When the interaction involved a bike, cyclists with high levels of Overconfidence recorded lower levels of risk than drivers with high levels of Overconfidence. However, when the interaction involved a car, cyclists with high levels of Overconfidence demonstrated higher perceived risk than drivers with high levels of Overconfidence. The interaction between Incompetence and Configuration was only significant for Failing to yield.

The results of the analyses of the effects of responsibility for the violation were then presented. Fewer cyclists rated the risk of an accident as likely or very likely if they were responsible than if a driver was responsible in situations of Failing to yield, Going through a red light and Not signalling but the reverse pattern was true for Swerving and Tailgating. A higher percentage of females perceived high levels of risk when they were responsible for the violation than did males.

The chapter which follows discusses these results in terms of the research questions and hypotheses. It then goes on to compare the results with earlier research and to discuss the strengths and limitations of the research and its implications for road safety and further research.

Chapter 5: **Discussion**

5.1 Introduction

This thesis examined factors influencing perceived risk in cycling. In recent years, governments have embarked on a number of initiatives that have increased and continue to increase participation in cycling. Increased participation in cycling is expected to bring about improvements in health and environment as well as help to create more sustainable and resilient transport networks. However, many drivers and non-cyclists perceive cycling as an extremely risky activity. Women in particular are concerned about the risk of injury. Government programs aimed at improving levels of cycling participation, and associated health benefits could be undermined by low rates of cycling participation by women.

The primary aim of this research was to better understand factors influencing perceived risk in cycling, with a particular focus on gender differences. This study examined the level of crash risk perceived by experienced male and female cyclists and drivers across a number of high-risk situations in which one of the road users engaged in a traffic violation. Six specific research questions were identified to guide the program of research:

1. *Do male and female cyclists and drivers perceive different levels of crash risk in the same situation?*
2. *Do cyclists and drivers perceive a different level of crash risk in the same situation?*
3. *Does the type of interacting vehicle affect the level of perception of crash risk?*
4. *Does the amount of experience and perception of skill influence the level of perceived risk of being in a crash?*
5. *Does the frequency of committing traffic violations affect the level of perceived risk?*
6. *Does the degree of control (whether it is the individual or the other road user) affect the level of crash risk?*

Based on the literature review, hypotheses were developed for each of the research questions.

The chapter commences by summarising the results of the study in terms of the hypotheses. It then discusses these findings in detail and in relation to earlier research. A later section compares the results with those obtained in the French study from which the questionnaire was adapted (Chaurand & Delhomme, 2013). The chapter concludes by noting limitations of the study and considering the implications for theory and road safety.

5.2 Support for study hypotheses

This section summarises the results of this study in relation to each of the hypotheses outlined in Chapter 2.

Hypothesis 1: Female car drivers and cyclists will perceive greater crash risk than male car drivers and cyclists (RQ1).

This hypothesis was supported with females giving higher ratings of perceived risk than males, these differences were significantly significant (p=.019). The gender difference for risk perception was not dependent on whether the female chose to cycle or to drive, as both female cyclists and drivers rated higher levels of perceived risk than male cyclists and drivers. There was an overall pattern of females perceiving higher levels of risk when the participant was the one who committed the violation. With a higher percentage of female participants than males perceiving that an accident was likely if they engaged in the road rule violations.

Hypothesis 2: Car drivers will perceive higher crash risk than cyclists (RQ2).

This hypothesis was supported with significant main effects between risk rating and participant type (p=.025). However, the general pattern of drivers reporting higher levels of risk than cyclists was absent for Failing to yield and Not signalling when turning. Drivers appeared to perceive similar levels of risk for interactions with both a car and bicycle whereas cyclists perceived the risk of interacting with another bike to be much lower than interacting with a car.

Hypothesis 3: Cyclists and drivers will differ in their perceived crash risk for some situations in a way that may contribute to crashes (RQ2).

There was some support for this hypothesis. The factors which affected risk ratings showed some differences across various situations. This study found that in relation to the bike-car and car-bike interactions: Going through a red light, Failing to yield and Not signalling when turning, cyclists and drivers perceived different levels of risk for the same interaction. For these three situations cyclists rated much higher levels of perceived risk than drivers. The number of cyclists who rated the risks associated with these incidents as likely/very likely was significantly lower when they were responsible for the infringement than when a driver was responsible. For the same three situations (Going through a red light, Failing to yield and Not signalling when turning), a significantly larger percentage of drivers rated the risk as likely/very likely when they were responsible for the infringement than when a cyclist was responsible. Despite a higher risk associated with responsibility for the violation, drivers reported a higher frequency of noncompliance for Failing to yield than cyclists.

Overall, drivers reported a higher level of perceived risk than cyclists and drivers self-reported a higher frequency of engaging in four of the six traffic violations: Tailgating, Failing to yield, Swerving and Not checking traffic than did cyclists. Tailgating was rated the highest level of risk by both cyclists and drivers. Regardless of the higher evaluation of risk Tailgating had the highest self-reported frequency engagement by drivers and second highest frequency by cyclists, suggesting that both cyclists and drivers perception of risk for the activity was not consistent with their reported behaviour.

Hypothesis 4: Perceived crash risk will be higher when interacting with a car than with a bike (RQ3).

This hypothesis was not supported. There was no statistically significant difference in the overall risk perceived in interactions with a bicycle versus interactions with a car, with a difference only being found for Failing to yield. However, whether the participant was a cyclist or driver was significantly associated with the type of interacting vehicle and the level of perceived risk for all situations. Drivers rated similar levels of risk for interactions involving both bicycles and cars. Cyclists rated higher levels of risk when interaction involved a car higher than with a bicycle. Cyclists rated the level of risk lower than drivers when the interaction was with a bicycle and higher than drivers when the interaction was with a car.

Hypothesis 5: Lower levels of perceived crash risk will be associated with drivers' and cyclists' greater experience with their transportation mode (RQ4).

This hypothesis was supported when experience was measured in terms of the age of the participant. Generally risk perceived decreased within older age groups, with the lowest ratings being given by the 70-79 age group. This hypothesis was supported when experience was measured in time spent per week, and marginally when experience was expressed as frequency of use per month (p=.051). Participants who recorded travelling less than 30 minutes per week and those who recorded travelling 15 hours or more per week perceived the lowest levels of risk. Perceived risk was highest for those who reported 'Never' riding a bicycle 54.7% of female and 48.2% of male drivers.

Hypothesis 6: Lower levels of perceived crash risk will be associated with higher levels of perceived skill (RQ4).

This hypothesis was supported for the perceived skill subscales of Control and Incompetence, but not for Overconfidence. Higher levels of perceived Control were associated with lower levels of perceived risk for both drivers and cyclists. Drivers with high ratings for Control recorded similar lower levels of risk for both interactions involving a car and a bike. Cyclists with high levels of Control recorded greater reduction of risk levels when the interacting vehicle was a bicycle then when the interacting vehicle was a car.

High levels of Incompetence were associated with higher levels of perceived risk by both drivers and cyclists. However, when the interaction involved a car cyclists recorded less effect on the level of risk rated.

Higher ratings of Overconfidence were associated with lower levels of risk when the interaction involved a bike for both drivers and cyclists. Cyclists with high levels of Overconfidence recorded lower levels of risk than drivers with high levels of Overconfidence. However, when the interaction involved a car, cyclists with higher scores for Overconfidence demonstrated higher levels of perceived risk than cyclists with lower scores for Overconfidence.

Hypothesis 7: Perceived risk will decrease with higher frequency of past violations (RQ5).

There was no statistically significant relationship between risk rating and the violation score. An ANOVA analysis conducted for each situation recorded significant main effects and interaction between risk rating the frequency of violation for the situations Failing to yield (p=.014), Going through a red light (p= .032) and Tailgating (p= .045) (see Table 4.16), which were the violations that participants reported engaging in most frequently. This partially supported the hypothesis in regards to cyclists and female drivers who had an increased self-reported frequency of past violations also recording lower levels of perceived risk. However, male drivers who reported higher frequency of non-compliance had increased levels of perceived risk.

Hypothesis 8: Lower levels of perceived crash risk will be associated with higher levels of responsibility for the violation (RQ6).

This hypothesis did not receive general support. Drivers showed higher risk ratings when responsible for the violation in relation to the items: Failing to yield; Going through a red light and; Not signalling when turning. It was however supported for three of the six situations for cyclists (Failing to yield, Going through a red light and Not signalling when turning), but cyclists reported different responses (higher risk ratings when responsible for the violation) for Swerving and Tailgating.

5.3 Gender differences in perceived risk

The issue of gender differences in perceived risk was the principle focus of this research. The research found that females notably rated the risk for the interactions under examination in the survey higher than males. These results were consistent with gender differences previously identified in selected risk perception surveys (Byrnes, et al., 1999; Gustafson, 1998). In the current study the gender difference was larger than the difference between cyclists and drivers, larger than the effect of experience and certainly larger than the effect of type of interacting vehicle (which was not significant). Females who chose to cycle gave similarly elevated perceptions of risk (compared with males) as the females who drove but did not ride at least weekly. Thus, the results do not support the contention that females who cycle are somehow an aberrant subset of females who do not share the general pattern of perceiving higher levels of risk than males. This finding raises the interesting prospect that reducing the objective (and thus subjective) risk in cycling may not remove the gender discrepancy in cycling participation, but simply increase the levels of cycling among both genders. Yet this possibility is not consistent with the observation of similar levels of cycling by males and females in countries where cycling in mainstream and considered a low risk activity (e.g. Denmark and the Netherlands).

The current study asked participants to judge crash risk in a set of objectively high-risk situations, rather than asking about the risk of cycling more generally as in earlier research. The gender differences were statistically significant for some situations but not others. The situations in which female participants gave higher risk ratings (Not signalling when turning, Swerving[1] and Tailgating) are arguably those which could be classed as lapses or errors. The situations where the risk ratings did not differ according to gender (Failing to yield, Going through a red light and Not checking traffic when turning) can be better understood as being deliberate violations.

The overall pattern of females perceiving higher levels of risk than males was also evident when the participant was the one who committed the violation, with a larger percentage of female participants perceived an accident was likely or very likely if they violated the road rule. The overall trend of decreasing levels of perceived risk with increased age was uniform for both males and females regardless of whether they were a cyclist or driver, and females consistently reported higher levels of perceived risk across age groups.

Previous research found that females identified a lack of safety in the street environment as a reason for not engaging in cycling as an activity (Garrard, et al., 2008; Sorensen & Mosslemi, 2009). The results of the current study have identified that in Australia female road users perceive a higher level of risk within the transport environment than males for the same interactions. Thus, while females repeatedly identify safety concerns, it may remain difficult for males to fully comprehend the level of safety required to encourage female participation in cycling. Street design, safety assessment and transport policy have been predominantly a male domain,

[1] While the term ‘Swerving’ sounds deliberate, the wording of the item is more in terms of a vehicle control error “In a right-hand curve, a bicycle rider/car coming the other way is going too fast and crosses over the centre line”.

developed with a male perspective of the acceptable level of safety. There is a need for all members of the population to feel safe in order to achieve the desired targets of cyclist participation. As recommended in previous research, implementation of good cycling infrastructure will benefit not only females but all members of the community.

5.4 Cyclist-driver differences in perceived risk

Consistent with the findings of previous research (Chaurand & Delhomme, 2013), cyclists overall gave lower ratings of risk than drivers, with the general pattern of drivers reporting higher levels of risk than cyclists was not supported only for the item Not signalling when turning. Perceived risk was not affected directly by whether the interacting vehicle was a car or a bike, however, different effects were found conditional on whether the participant was a cyclist or driver. Drivers recorded similar levels of risk for interactions involving a bicycle as for a car. Cyclists recorded similar levels of risk as drivers for car-bike interactions, and cyclists only recorded a lower level of perceived risk than drivers when the interacting vehicle was a bicycle. However, these differ between the levels of risk were not statistically significant. This result was different to the previous French study, in which the level of perceived risk was significantly lower for interactions with a bike than with a car (Chaurand & Delhomme, 2013). The results may reflect different interpretations between Australian and French participants for the term “accident”.

In situations of Failing to yield, Going through a red light and Not signalling, fewer cyclists rated the risk of an accident as likely or very likely if they were responsible than if a driver was responsible. However, the reverse pattern was true for Swerving and Tailgating. Drivers and cyclists shared the same high level of risk if they or another road user was the one responsible for Not checking traffic.

5.4.1 Effect of experience and perceived skill on perceived risk

Following the approach taken by Chaurand and Delhomme (2013), the perceived risk of each participant was measured on three scales: perceived Control, Overconfidence and Incompetence. There was no statistical association with the level of risk perceived by the participant and their skill scale score for Overconfidence. The participants’ scores for Control had a significant association with the level of risk rated for the situations of Failing to yield and Not checking traffic. Higher Incompetence scores were significantly associated with higher risk level ratings for all six situations.

The three perceived skill scales were influenced by the type of participant: whether they were a cyclist or a driver, male or female and; the type of interacting vehicle. Although not statistically significant the following observations were made cyclists assessed themselves with higher scores for perceived Control and Overconfidence and lower scores for Incompetence than drivers. Both cyclists and drivers with higher levels of perceived Control reported lower levels of perceived risk, with cyclists who reported high Control scores recording notably lower levels of risk. Higher levels of perceived Overconfidence were linked to lower ratings of risk levels for drivers. Cyclists with high Overconfidence scores had higher perceived risk ratings than cyclists with lower Overconfidence scores when the interaction involved a car and lower risk rating for interactions with a bicycle. Consistent with earlier studies that linked Overconfidence with greater experience (Martha & Delhomme, 2009), a participant's perception of skill was strongly linked with their travel experience, and participants with higher Overconfidence and Control scores and lower Incompetence scores spent longer and more frequent periods of time travelling.

Because of the different gender distribution between the cyclist and driver groups, the results of the perceived skill scales were examined to identify associations between skill scores and gender. Previous literature identified that males had a tendency to evaluate themselves as more skilful and competent than females (DeJoy, 1990; McKenna, et al., 1990; Ozkan & Lajunen, 2006). Overall, these results found male participants' risk ratings were more reactive, with greater levels of increase or decrease linked to their level of Control and Overconfidence than females. Of the four road user groups male cyclists rated themselves the most skilful, with the highest scores for Control and Overconfidence and lowest scores for Incompetence. The highest scores were recorded by male cyclists aged 40-49 who travelled four or more times a week and between 10-15 hours per week.

Female cyclists and drivers had lower scores for the skill subscale of Control than male drivers and cyclists. However, female cyclists rated higher Overconfidence and lower Incompetence scores than male and female drivers. For female cyclists Overconfidence and Control ratings increased with higher frequency of travel, time spent travelling and with age until aged over 70 where this rating reduced notably. Female and male cyclists recorded a significantly longer quantity of time spent travelling per week than drivers, in particular female drivers. Thus, for females as with males, experience was a major factor for increasing perceived Overconfidence and for giving a more favourable evaluation of their own capabilities (Chaurand & Delhomme, 2013; Martha & Delhomme, 2009).

Female drivers recorded the lowest scores for Control and Overconfidence and the highest scores for Incompetence of the four road user groups. The low Incompetence scores of female drivers were associated with younger drivers, infrequent driving (1 or 2 times a month) and driving longer periods of time per week. The Incompetence scores of female drivers may also have been influenced by the survey question: The presence of passengers in the car distracts me and interferes with my driving. Female drivers are more likely to experience carrying children, who are more distracting than adults, and may automatically consider children in response to this question.

5.5 Effect of violation frequency on perceived risk

There was no overall significant statistical association between the level of reported risk rating and the frequency a participant engaged in traffic violations. However, the frequency of violation was associated with Age group, Monthly use, Control and Incompetence. The frequency of violation decreased with increased age, with the highest frequency being reported by the 30-39 age group. Violation frequency increased with monthly trip frequency, however monthly frequency was not associated with risk rating for any of the six situations.

Higher levels of perceived Control reported were associated with lower levels of self-reported frequency of engaging in traffic violations. Overconfidence was not statistically associated with self-reported frequency of traffic violations; male cyclists and drivers with higher levels of Overconfidence reported slightly higher frequency of traffic violations. Female drivers and cyclists with higher levels of Overconfidence self-reported lower involvement in traffic violations. While males overestimating their own capabilities and having a higher perception of skill and greater sense of optimism than females has been linked with higher likelihood of participating in risk-taking behaviour (DeJoy, 1990; Henley & Harrison, 2012; Norton, et al., 2010), this study found male cyclists and drivers who recorded higher levels of Overconfidence did not report engaging in more traffic violations.

In contrast to the media portrayal of cyclists as more likely to be involved in traffic violations (Rissel et al. 2010; Wahlberg & Sjoberg, 2000), cyclists in this study were not more likely than drivers to engage in traffic violations. Cyclists self-reported a higher non-compliance than drivers for two of the six traffic violations: Going through a red light and; Not signalling when turning. In Queensland and some other Australian states cyclists are required to signal only when turning right. The wording of the question; Not indicate when you are going to turn? does not identify the direction, thus the results for this interaction may not reflect the involvement in traffic violations by cyclists (Department of Transport and Main Roads, 2014). Drivers reported higher non-compliance for the traffic violations Failing to yield, Swerving, Tailgating and Not checking traffic. This research found that there was no statistical association between gender and engaging in traffic violations, and all the road user groups (male and female cyclists and drivers) self-reported engaging in traffic violations.

Increased frequency of traffic violations was significantly associated with higher Incompetence scores for all road user groups, with this relationship strongest for female drivers. In line with previous studies that reported females had a more positive attitude to traffic laws and committed fewer violations (Laapotti, 2004), overall females reported engaging less frequently in traffic violations than males. However, more female drivers self-reported Going through a red light and Swerving than male drivers. When integrated with the effect of Incompetence scores for female drivers, these results suggest that many traffic violations may be the result of distraction, mistakes and unintentional actions rather than calculated risk-taking behaviour encouraged by Overconfidence. This finding is consistent with a Queensland report of police-reported bike/car crashes that identified undue care and attention, failing to obey a road sign or signal and a cyclist or driver engaged in traffic violations such as those under examination were main crash causes (Schramm, et al., 2010).

Participants in the study reported that in the previous three years traffic fines had been received by 32.5% of drivers, gender had no effect on the likelihood of a fine with females 31.6% and males 33.9%. Only 2.5% of cyclists had received a fine for a cycling related offence, so it is possible that drivers' outrage over cyclists breaking traffic rules results from the opinion that cyclists are engaging in traffic violations without effective legal sanction than cyclists engaging in more traffic violations.

Participants were asked to record their crash history over the past three years. This survey found that cyclists were more likely than drivers to have been involved in an accident in the previous three years (47.3% versus 21.2%). Consistent with other reports (Henley & Harrison, 2012), two thirds (62.4%) of the reported cyclist crashes were single vehicle crashes, not involving another road user (see Appendix B9, B10 and B11). As with existing cycling studies, there was no statistically significant association between gender and crash involvement reported by participants in this study (Appendix B10 and B11) (Heesch et al., 2011; Washington et al., 2012).

5.6 Effect of degree of Control (responsibility for the violation) on perceived risk

The variable Control was measured by asking the participant to rate the probability of an accident if they were responsible for the risky action or traffic violation. Unlike the French data, the bimodal distribution of risk ratings for some of the Control items signified that ANOVAs could not be used to compare mean risk ratings for this study.

The study found there was an overall pattern of females perceiving higher levels of risk than males if they were responsible for the actions. A higher percentage of female participants perceived an accident was likely if they violated the road rule than males. Cyclists considered Failing to yield, Going through a red light and Not signalling when turning as less likely to result in an accident if they were non-compliant than if a driver committed the violation. These traffic violations were those that cyclists self-reported most frequently engaging in. On the other hand Swerving, Tailgating and Not checking were generally considered by cyclists as more likely to result in an accident than if a driver committed the violation. Despite a high risk perception of Tailgating, it was the second rated violation after Not signalling when turning that cyclists most frequently reported engaging in.

Drivers considered non-compliance of all traffic violations except Tailgating as a higher risk than cyclists with Not checking traffic rated an equal risk for both themselves and the cyclist. For drivers Tailgating and Not checking traffic were the most frequent reported violations.

5.7 Comparisons of the French and Australian results

The current study used a similar methodology as the Paris study by Chaurand and Delhomme (2013). Care was taken to adapt the survey, recruit comparable participants and conduct the analysis to ensure a meaningful comparison between the two studies could be conducted.

5.7.1 Participant characteristics

The gender distribution of cyclist participants in the Australian study (31.5% female) was comparable with the French study (28.4% female). However the Australian study had relatively more female drivers (67.3%) than the French study (30.1%). The French cyclists recorded a mean frequency of 5.51 days per week, median time between 5 and 10 hours and median distance 20 and 50 km. Australian cyclists reported a median frequency of 4 to 6 times a week, between 5 and 10 hours and median distance of over 100 km. Thus, both Australian and French cyclists rode a similar amount of time and frequency, however Australian cyclists reported they cycled greater distances. In the Australian survey 70 (15.1%) cyclists who indicated they rode to work less than once a week would not have been classified as cyclists by the French study (Chaurand & Delhomme, 2013).

The Australian study found higher risk ratings by female participants across all situations and a higher percentage of females rated an accident as likely if they were the one who committed the traffic violation. While the high female representation in the Australian driver group may result in higher risk ratings than drivers in the French study, even if only the Australian males been included in a comparative analysis, it still would have a higher mean risk rating than the French data.

5.7.2 Comparison of French and Australian rating of perceived risk

Overall, the participants of the Australian survey rated the risk for all six situations higher than French participants (see Table 5.1). Tailgating was identified as the most risky situation by both French and Australian participants and Not signalling when turning as the least risky.

Table 5.1 Mean risk rating of French and Australian participants (including the data for responsibility)

Situation	Australia		France	
	Mean	SD	Mean	SD
Failing to yield	3.21	0.91	2.62	0.05
Going through a red light	3.34	0.99	3.02	0.05
Not signalling when turning	2.95	0.86	2.53	0.05
Swerving	3.27	0.98	2.96	0.06
Tailgating	3.67	0.94	3.23	0.06
Not checking traffic	3.56	1.09	2.64	0.06
Total	3.33	0.81	2.73	0.05

1= low risk to 5= high risk

French drivers and cyclists perceived less risk than Australian drivers and cyclists for all situations. Lower risk was recorded for all six interactions that involved a cyclist rather that a driver that violated a road rule than a driver by both French and Australian participants (see Table 5.2).

Table 5.2 Australian and French participants, mean risk rating by Situation and type of interacting vehicle (excluding the data for responsibility)

Interacting vehicle	Australian		French	
	Mean	SD	Mean	SD
Failing to yield Cyclist	2.55	1.15	1.76	0.05
Failing to yield Driver	3.66	1.09	3.10	0.07
Going through red light Cyclist	2.88	1.20	2.27	0.07
Going through a red light Driver	3.86	1.15	3.73	0.06
Not signalling when turning Cyclist	2.64	1.06	1.96	0.05
Driver not signalling when turning Driver	3.32	1.07	3.09	0.06
Swerving Cyclist	2.85	1.15	2.25	0.06
Swerving Driver	3.49	1.11	3.46	0.07
Tailgating Cyclist	3.59	1.01	2.76	0.06
Tailgating Driver	3.98	1.01	3.68	0.06
Not checking traffic Cyclist	3.26	1.18	2.10	0.06
Not checking traffic Driver	3.69	1.24	2.76	0.06

1= low risk to 5= high risk

An overall calculation was undertaken of the means for French and Australian drivers and cyclists for the each situation, excluding when the participant carries out the risky behaviour or the traffic violation. This showed that both French drivers and cyclists perceived less risk than Australian cyclists and drivers for all situations except Swerving where French drivers rated the risk higher for Swerving than Australian cyclists (see Table 5.3). French drivers rated the risk higher than French cyclists for all six situations. Australian drivers rated the risk higher than Australian cyclists for the situations Going through a red light, Swerving, Tailgating and Not checking traffic (see Table 5.3). Australian cyclists rated not signalling when turning as the least risky and Tailgating as the most risky behaviour. French cyclists rated Failure to yield and Not checking as the least risky and Tailgating as the most risky behaviour. Both Australian and French drivers rated Tailgating as the most risky behaviour and Not signalling when turning as the least risky.

Table 5.3 Australian and French cyclist and driver, mean risk rating by Situation (excluding the data for responsibility)

Situation	Australian cyclist Mean	Australian driver Mean	French cyclist Mean	French driver Mean
Failing to yield	3.11	3.07	2.33	2.80
Going through a red light	3.31	3.54	2.88	3.44
Not signalling when turning	3.00	2.93	2.51	2.60
Swerving	3.06	3.50	2.80	3.08
Tailgating	3.75	3.91	3.12	3.61
Not checking traffic	3.39	3.72	2.33	2.79

1= low risk to 5= high risk

There was no statistical significance for Australian participants (*F* (1) =.09, p=.759) for whether the interacting vehicle was a car or a bicycle. In the French study participants rated significantly lower levels of risk when the interacting vehicle was a bicycle that violates a road rule than for a car (*F* (1,426) =95.27, p<.001). The difference between the level of risk for the interaction with a car or a bike was greater for French drivers and cyclists than for Australian cyclists and drivers (Figure 5.1). French and Australian drivers viewed most of the situations interacting with a bike as less risky or similar levels of risk as cyclists. Australian drivers rated the risk higher for interaction involving with a bicycle Failing to yield that for a car (see Table 5.1). Australian drivers rated risk higher than French drivers, except for the situation Failing to yield when the interaction was with a car (see Table B19). Australian cyclists (m= 3.47) rated the risk higher than (French cyclists m=3.49) for all interactions except Swerving with a car that violates the road rule.

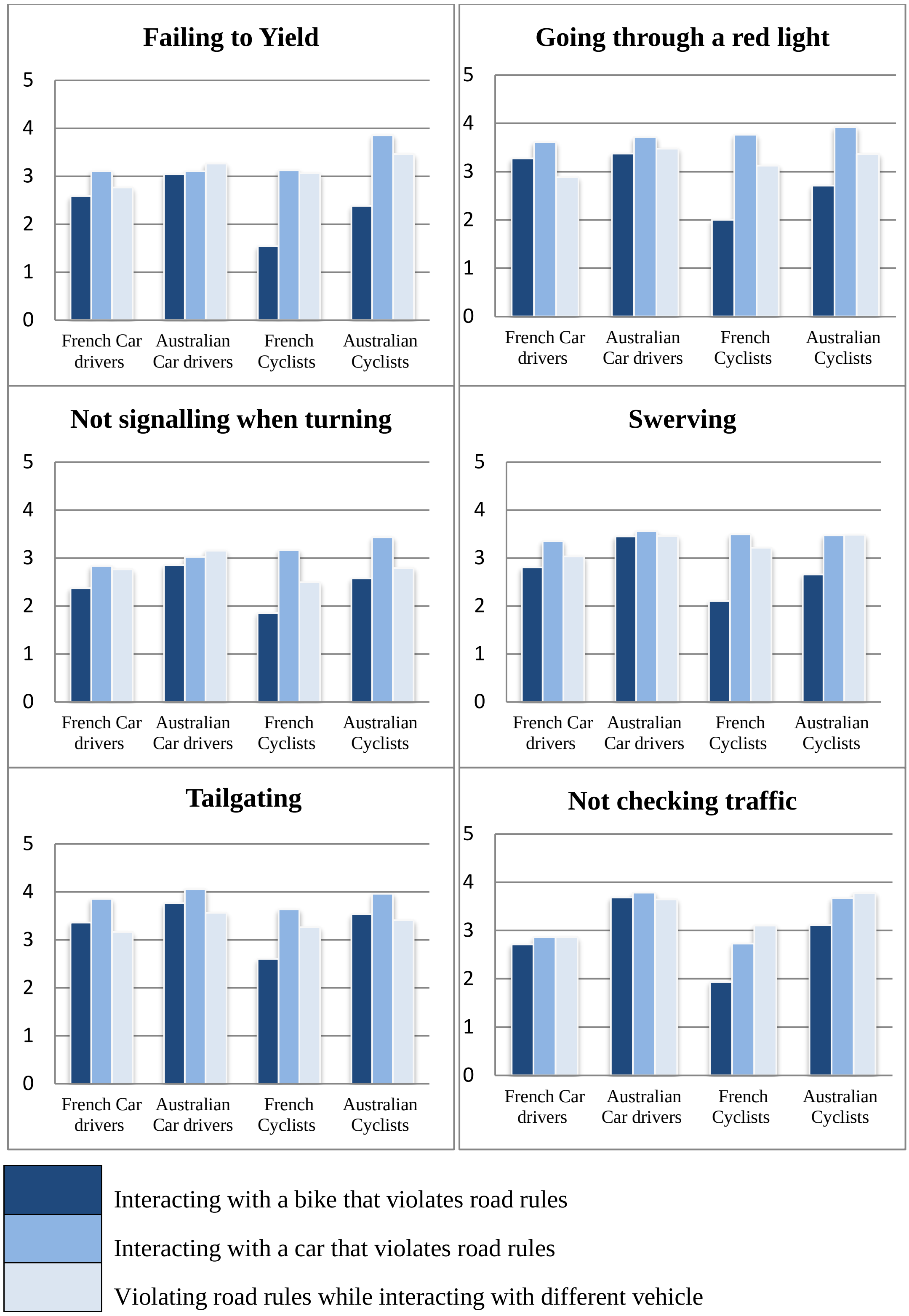


Figure 5.1 French and Australian, cyclist and driver mean risk rating by Situation and Configuration.

There are a number of differences between France and Australia that may explain the difference in risk associated with cycling. France has approximately 3% of journeys made by bicycle which is almost double the 1.6% of journeys made by bicycle in Australia, and greater numbers of cyclists may reduce perceptions of risk associated with cycling. Cyclists in the French study were experienced cyclists who all used their bicycle to commute once a week or more whereas 15.1% of cyclists in the Australian survey never used their bicycle to commute to work or study. These Australian cyclists may have less experience riding in traffic and accordingly rated higher risk.

French driver participants in daily travel encounter more cyclists; thus, they may have an increased awareness and experience of sharing the road resulting in a lower perception of risk. Greater numbers of people cycling in France and Europe generally suggests that many more people who drive also cycle which would result in improved communication skills and understanding of travel behaviour between road users. Paris may have more cycling infrastructure such as separated cycle lanes than Australia resulting in lower risk perceived by participants. French drivers may be more considerate and have better road user behaviour show that Australian drivers making cycling objectively safer.

French and Australian cyclists' travel characteristics reveal Australian cyclists report covering greater distances within the same median frequency and time. It is possible Australian cyclists travel at higher speeds over longer distances resulting in increased risk exposure and experience, resulting in a higher risk perception associated with cycling. Increased distance and speed could be associated with the geography of Australian cities resulting in longer commuter journeys and also the representation of high levels of participation in recreational on-road sport cycling.

5.7.3 The effect of Control on the perception of risk

A comparison between the French and Australian studies on the effect of Control was not possible due to the different analysis methodology employed. Participants were asked to identify how likely it was that a situation would result in an accident if they were the road user who violated one of the road rules. The Australian participant responses resulted in a bimodal distribution of rating and were examined using percentages of participants who thought the interaction would result in a crash. While the initial means analysis is included in the graph (see Figure 5.1) only a comparison of a general nature can be made.

Overall, French cyclists and drivers recorded that it was less likely that a situation would result in a traffic accident if they engaged in a traffic violation than Australian drivers and cyclists.

When responsible for executing the traffic violation; Australian drivers perceived higher levels of risk than Australian cyclists if they were responsible for Going through a red light, Tailgating and Not signalling when turning, French drivers perceived higher levels of risk for Not signalling when turning than French cyclists.

5.7.4 Gender differences in Australia and France

To facilitate the comparison of the gender data for the risk ratings of both surveys, the French researchers Nadine Chaurand and Patricia Delhomme provided gender data from their survey. A gender difference was identified in both the French and Australian surveys. Australian (m=3.56) and French (m= 2.99) females rated the risk higher for the overall risk score than Australian (m=3.18) and French (m=2.76) males on a scale of 1 low to 5 for high crash risk. There was a consistent higher risk rating by females for all of the six situations in both the French and Australian surveys; however, French females rated the risk lower than Australian males in all situations except Swerving (see Table 5.4). Differences between male and female risk ratings did not change those situations perceived as most risky (Tailgating) or least risky (Not signalling when turning) (see Table 5.4).

Table 5.4 French and Australian male and female mean risk rating by Situation

Situation	Australian				French			
	Female		Male		Female		Male	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Failing to yield	3.20	0.93	3.04	0.92	2.68	0.91	2.58	0.92
Going through a red light	3.67	0.92	3.17	1.03	3.16	1.08	2.97	1.07
Not signalling when turning	3.17	0.85	2.86	0.93	2.68	0.95	2.47	0.96
Swerving	3.37	0.95	3.04	1.01	3.23	1.13	2.86	1.14
Tailgating	3.99	0.80	3.65	0.97	3.30	1.09	3.20	1.09
Not checking traffic	3.78	1.01	3.28	1.18	2.89	1.05	2.50	1.06
Total	3.56	0.63	3.18	0.79	2.99	0.86	2.76	0.86

1= low risk to 5 =high risk

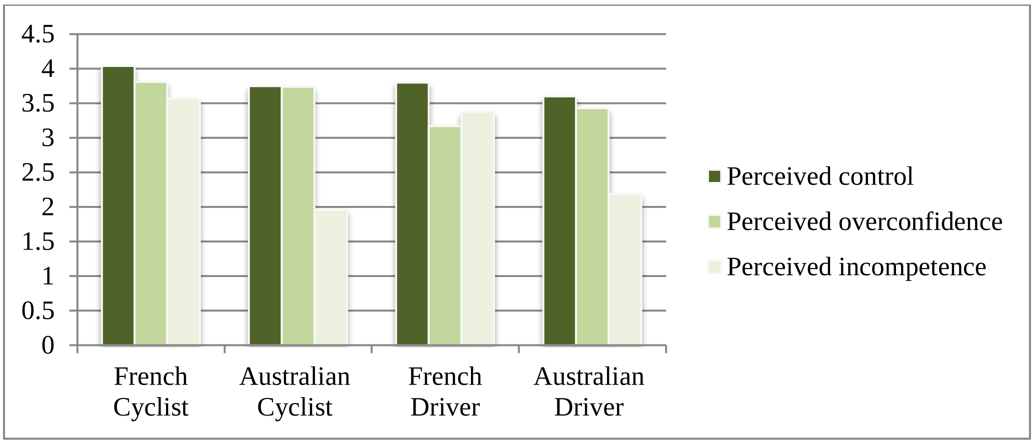
An association between increased weekly time spent travelling and decreasing levels of perceived risk was noted only in the Australian study. The frequency of self-reported traffic violations did not have an impact on risk perception for either the French or Australian participants.

The French research (Chaurand & Delhomme, 2013) highlighted a significant association of higher frequency of helmet wearing with higher levels of perceived risk. In the Australian survey helmets were reported as always worn by 90.3% of cyclist participants and most of the time by 7.7% of cyclist participants. Seatbelts were reported as always worn by 95.4% of driver participants and most of the time by 3.3% of driver participants.

5.7.5 Effect of perceived skill scores in Australia and France

The sub-scores measuring perceived skill revealed similarities between Australian and French cyclists, both with higher scores for perceived Control and Overconfidence than Australian and French drivers (see Figure 5.2). Both French and Australian participants with higher scores for Control and Overconfidence had lower ratings of perceived risk. French cyclists rated themselves higher scores for Control and Overconfidence than Australian cyclists, which could be responsible for overall lower perceived risk levels when interacting with a bike (see Figure 5.1).

Incompetence scores were different between the two surveys. Australian cyclists had significantly lower scores than drivers (m=1.96 vs. m=2.19) whereas French cyclists rated themselves higher than drivers (m=3.57 vs. m=3.38). Higher Incompetence scores were linked to higher risk rating for both Australian and French participants. The different female distribution in the drivers groups may have resulted in a variation of Incompetence results between French and Australian surveys.



1= low risk to 5 =high risk

Figure 5.2 Perceived skill French and Australian cyclists and drivers

5.7.6 Conclusion

A comparison with the results of the French study (Chaurand & Delhomme, 2013) found overall, for all six situations, Australian survey participants rated the risk higher than French participants. The studies showed that French and Australian cyclists and drivers perceived the same situations as high risk and low risk. Tailgating was the most risky situation and Not signalling when turning as the least risky. The French study found the type of interacting vehicle, whether a bike or a car, was significant but this was not found for Australian participants. The difference between the levels of risk recorded for car and bike interactions was greater for French participants; with French cyclists and drivers rating the risk much lower when a bicycle violated a road rule than did Australian cyclists and drivers. When the interaction involved a car Australian drivers perceived slightly higher or similar levels of risk to French drivers. Drivers in both studies rated the level of risk for an interaction with a bike at similar levels to cyclists, while cyclists rated the risk lower for interactions with a bike.

There was a consistent higher risk rating by females for all the six situations in both the French and Australian surveys; however, French females rated the risk lower than Australian males in all situations except Swerving, which was rated higher by French female participants. While the effect of gender is evident for both nationalities, the results of the surveys show that gender is not influencing the overarching lower levels of perceived risk associated with cycling reported by French participants. Higher cycling participation in France may make drivers and cyclists perceive cycling as less risky, and higher exposure to cyclists may result in a better understanding and anticipation of vehicle and road user behaviour. Higher exposure may also have resulted in a more developed level of communication between road users.

Australian and French cyclists rated themselves higher scores than drivers on perceived Control and Overconfidence. French and Australian participants with higher levels of Control and Overconfidence were linked to decreased scores of perceived risk. The French and Australian surveys recorded different patterns for Incompetence scores, Australian cyclists had significantly lower scores than drivers (m=1.96 vs. m=2.19) whereas French cyclists had higher scores than drivers (m=3.57 vs. m=3.38). For both Australian and French participants higher Incompetence scores were linked to higher risk rating.

Weekly time spent traveling was associated with the rating of perceived risk only for Australian participants. Both Australian and French cyclists rode a similar amount of time and frequency; however, Australian cyclists reported they cycled greater distances. Thus, Australian cyclists may travel at greater speed, which would equate to higher risk associated with the activity and could be a factor for higher risk levels among Australian cyclists.

5.8 Study limitations

There are limitations associated with the study regarding the recruitment of participants, the method and the analysis of the survey data that bear consideration.

5.8.1 Recruitment

One limitation was due to the methods used to approach and recruit cyclist participants. Details of the survey were placed onto the information and forum pages of cycling web sites and distributed by bicycle user groups. This method of recruitment may have attracted cyclists who belong to these dedicated enthusiast groups and who are not representative of the general cycling population. Driver participants were not recruited through similar motoring enthusiast web sites therefore may not have had similar motivations and behaviours. The study found that the purposes for which cyclists and drivers reported using their method of transport varied significantly. The differences in the purposes cyclists and drivers used their bicycles and a car (respectively) supports the contention that motivations may have differed. For example cyclists used their bicycles less for commuting that drivers used their cars. Conversely, bicycles were more often used for recreation. Greater exposure, motivation and travel experience from cycling enthusiasts may influence the level of risk perceived in the scenarios.

A further limitation of this method of participant recruitment was that the research is not able to calculate response rate, because it is unknown how many prospective participants were exposed to the survey information.

The numbers of drivers and cyclists in the sample may have potentially influenced the overall level of risk reported. The survey was completed by a smaller number of drivers than cyclists; this may have resulted in the overall results being skewed towards cyclists as there may have been too few drivers to provide sufficient statistical power to detect differences among drivers in certain instances.

There were more females in the driver group than males and in the cyclist group more males than females. Thus, any overall mean differences in risk ratings between genders or between cyclists and drivers may have been confounded by these unequal representations. However, the ANOVA analysis considered these separately and so accounted for this concern. In contrast, the French driver group consisted of more males than females. Thus in the comparison of the two studies differences in gender distribution may have contributed to the overall higher risk rating for Australian drivers than French drivers.

The online survey excluded participants under the age of 18 and all participants of the survey with the exception of one cyclist were 20 years old or above. Therefore the study does not include information about drivers and cyclists under the age of 20. In Australia the 15 – 19 age group has the highest rate of land transport serious injury per population (Henley & Harrison, 2012), therefore, the findings may not be relevant for this age group. Recruitment methods for future studies of cycling and driving may require more focus and promotion to this age group. In addition, many studies have focused on the safety of child cyclists and factors relevant to their participation. In that case, it may well be the risks perceived by parents that are more relevant to study.

5.8.2 Method

The questionnaire used was quite complex and some of the terms used may have been ambiguous. A personal interpretation of the likelihood of an accident and consequences of each situation may be different between cyclists and drivers. Car drivers might not perceive a potential collision with a cyclist as an injury risk to themselves and therefore rate it as low risk even though the risk of a collision might be relatively high. The questionnaire was an adaption from the original French questionnaire through a process of translation and a small number of items proved difficult to translate. Although discussions were held until a consensus was reached among the researchers some terms for example, “I have an easy riding style”, may have had different interpretations for participants.

In both France and Australia, cycling is a minority mode of transport, which is socially portrayed as unsafe and vulnerable. This may have contributed to drivers higher risk rating of interactions with cyclists. Conversely, as Chaurand and Delhomme (2012) note, people who choose to ride a bike even with these social attitudes are motivated and committed to engaging in what is perceived as risky behaviour. This could account for the greater perceived skill scores recorded by cyclists for Control and Overconfidence in both the French and Australian study. This suggests that the results of the French and Australian studies may not generalise to countries in which cycling is a much more common and accepted mode of transport.

Another limitation may be the use of a questionnaire where by the participant is imagining each interaction while the participant is safely in front of their computer rather than actually driving or riding. The online questionnaire used a written description of the transport environment where the interaction occurred; this signifies that participants will imagine their individual experience of transport routes and traffic. While the questions repeated descriptions that the situations were located in urban low speed environments, the conceptualising of the situation was still reliant on the participants’ interpretation of low speed traffic. This may have led to some participants imagining situations occurring in high transport volume locations with higher risk than locations with lower traffic volume. Future studies could use a simulator to place the participants in real driving and cycling situations to increase the validity of the perceived risk measures or use eye movement technology in on road studies to evaluate attention focus and various high risk situations.

The accuracy of self-reported violations may be limited as admissions of poor driving cycling behaviour might not fit with the self-image of a safe road user that the participant might have. Self-reporting of behaviours can be inaccurate or biased due to socially desirable responding. These inaccuracies may occur as a biased but honest self-deception or a deliberate tendency of giving favourable self assessment (Lajunen & Ozkan, 2011). Self-reporting of the frequency of engaging in traffic violations may also be influenced by forgetfulness or simply the participant is unaware that they have engaged in traffic violations (af Wåhlberg, 2009; Freeman et al., 2014; Lajunen & Ozkan, 2011). Therefore, participants may under report the frequency of committing traffic violations.

5.8.3 Analysis

Finally, the analysis of the survey data did not examine the effect of purpose of use on risk rating. A cyclist who mainly cycles for recreation may perceive risk differently than one who cycles mainly for transport, or drivers who drive for transport may perceive risk differently than cyclists who travel for recreation. Further analysis of the survey data may provide information on how purpose of travel affects perceived risk. Future analysis to adjust for a range of cofounders that could impact risk such as SEIFA, location and other demographic variables could provide further information of the effect of these factors on risk perception. For example, Cyclists and drivers who travel in major cities may perceive the risk of cyclist and driver interactions differently to those who cycle or drive in country towns.

5.9 Implications for theory and road safety

State government strategies aim to increase the percentage of commuter trips made by bicycle in Brisbane, from 1.6% in 2006 to 20% by 2031 (Queensland Government, 2011). For this to safely occur, changes in both road infrastructure and road user expectations and behaviors are required. Previous Australian cycling research found that females identified a lack of safety in the street environment as a reason for not engaging in cycling as an activity (Garrard, et al., 2008; Sorensen &

Mosslemi, 2009). The results of the current study have identified that in Australia not only female cyclists but also female drivers perceive a higher level of risk within the transport environment than their male counterparts for the same interactions. Thus despite females repeatedly identifying safety concerns, it may remain difficult for males to fully comprehend the level of safety required to encourage female participation in cycling. Street design, safety assessment and transport policy has been predominantly a male domain, developed with a male perspective of the acceptable level of safety. That females perceive higher levels of risk, and that males and females perceived different levels of risk should not be considered a negative factor or criticism of current road design and policy, but rather a new benchmark for safety in street design and road safety policies. Australian transport authorities could consider greater female input, as consultation in the policy and design of the transport environment.

As recommended in previous research, implementation of good cycling infrastructure will provide benefits not only to females but all members of the community. There is a need for all members of the population to feel safe in order to achieve the desired targets for cycling participation. Future studies could examine what types of transport infrastructure design promote feelings of safety among females.

While the Australian study recorded no significant association for the type of interacting vehicle, cyclists rated the level of risk higher for an interaction with a car than with a bike. French participants rated the risk significantly lower when the interaction was with a bike. The findings that some cyclists perceive less risk for some interactions with other cyclists, may result in less care and attention when cyclists travel in groups or encounter each other, increasing their risk of a crash. It can also be argued the other bicycles pose less of an injury risk to a cyclist than motor vehicles and for this reason a lower level of risk would naturally be perceived.

While generally cyclists recorded committing fewer traffic violations than drivers, they self-reported a higher frequency of committing the violations of Going through a red light and Not signalling when turning. However, Not signalling when turning left is not a cycling traffic violation in Australia. While most cyclists would consider that they had engaged in these violations only when considered safe to do so, drivers perceive a higher level of risk associated with these interactions. Cyclists need to be aware that intersections with lights signify that drivers may focus their attention on changing traffic lights and other cars, or increasing speed with the aim to pass through before the light turns red and may be less aware of their presence. Road safety information could promote an awareness of the need for extra attention in these situations, incorporating the fact that increased numbers of cyclists will require greater awareness on the part of drivers and increase their visual scanning for cyclists.

Gender is currently an important consideration when developing safety programs for drivers (Garrard, et al., 2006; Garrard, et al., 2008; Haworth & Schramm, 2011; Haworth, et al., 2010; Sener, et al., 2009) with most driver safety programs aimed at young, male drivers who engage in intentional traffic violations resulting from overconfidence. The both cyclist and driver participants in current research self-reported that inattention and mistakes caused by incompetence and distraction were a factor resulting in increased frequency of traffic violations. While unintentional traffic violations were common for all four road user groups, the strongest link was with female drivers, who recorded the highest frequencies of distractions such as carrying passengers, being in a hurry and lost in thought. This higher involvement by females could be linked to more frequent family responsibilities such as carrying children. However, it does not remove serious consequences when distractions result in a crash; undue care and attention were found to be a major cause of police-reported car-bike crashes (Schramm, et al., 2010). These findings suggest that "unintentional" traffic violations should also be the target of road safety campaigns in addition to the current focus on intentional violations. This is also important and relevant to the Safe Systems approach that mistakes should not have serious injury implications.

That both female cyclists and drivers reported elevated levels of risk relative to their male counterparts, raises the prospect that gender differences in perceived risk are linked to cultural influences in Australia rather than objective (subjective) risk. That similar levels of risk are perceived by female drivers (surrounded by the safety of car infrastructure) as by female cyclists, suggests there may be limitations as to the ability to change the level of perceived safety solely through the development of safer cycling infrastructure. Rather than concentrating on changing the level of risk perceived or associated with cycling, road safety programs may be better directed towards other identified fears. Campaigns directed at road user behaviours, such as intentional harassment and verbal abuse, may be also effective to reduce the overall fear associated with cycling.

Consistent with previous studies this research found no gender difference in cycling crash rates and that higher involvement by male riders could be accounted for by greater exposure (Heesch, Sahlqvist, et al., 2011; Washington, et al., 2012). Thus, it could be argued that perceptions of risks and actual risks vary, so changing risk perceptions might not change injury rates.

5.10 Suggestions for Further Research

There is injury risk associated with cycling, as with all physical activities, and every individual who chooses to cycle has assessed their risk of injury against their ability, skill and benefits (economic, health and enjoyment). While large numbers of Australians regularly cycle for recreation and sport, many generally choose not to cycle when commuting to work or study. It may be argued in many individual's evaluation the risks outweigh the benefits. Further research examining the impact that travel characteristics have on the levels of perceived risk, could provide a greater understanding for this line of research. For example comparisons between cyclists who travel for recreation and those who travel for transport, similarly comparisons between drivers who travel for transport and cyclists who travel for recreation.

It has been argued that the lack of a bicycle friendly environment and culture may underlie the gender difference in cycling participation in Australia (Garrard, et al., 2006). However, the current study found both female cyclists and drivers perceived higher levels of risk than their male counterparts. This finding suggests that improved cycling infrastructure may result in little change in the gender discrepancy of cycling participation. Male and female participation has increased along newly constructed cycling paths which supports the assertion that safe cycling network benefit all members of the community. However, it has not resolved the lower participation rates by females. Further research examining the role and affect that infrastructure design and environment has on road user behaviour would be desirable. A further study to examine if there are different levels of perceived risk between both males and females when they are using off-road paths and cycle lanes may reveal if the difference between males and female risk perception associated with cycling as an activity or travelling in traffic on public roads.

The comparison of this study with the results of the study conducted in Paris found Australian cyclists and drivers perceived higher risk then their French counterparts for all the interactions examined. Australian and French participants perceived similar levels of risk for interactions involving a car, however, French females recorded lower levels of perceived risk than Australian males. French cyclists and drivers rated interactions involving a cyclist with significantly lower levels of risk than Australian counterparts. Further research could explore similarities and differences in infrastructure design, road safety strategies and road safety policy in France and Australia to identify which interventions which have influenced the level of safety perceived by cyclists and drivers.

5.11 Conclusion

The current program of research has explored how a range of factors influence perceived risk in cycling. Cyclist and driver assessments of risk differed across situations in ways that potentially contribute to misunderstandings and crashes. The frequency with which an individual reports committing violations does not seem to directly influence perceptions of risk. Similarly no straight forward relationship was observed between responsibility for a violation and the level of risk perceived. Car drivers generally perceived a higher level of risk than cyclists particularly for bicycling. This may contribute greatly to their decision not to cycle themselves.

While previous research has identified a perceived lack of safety as a barrier to cycling by females, this study has identified that a higher level of perceived risk is also experienced by female drivers. Females who drive reported similar elevated levels of risk to those females who choose to cycle, compared to their male counterparts. Thus, the data does not support the contention that females who cycle are somehow an aberrant subset of females who do not share the general pattern of perceiving higher levels of risk than males. These findings suggest that the perception of risk may not be the dominant or only factor influencing transport choice. This raises the interesting prospect that even with a reduced objective risk for cycling many females in Australia may continue to choose not to cycle. That females who drive perceived a similarly elevated level of risk suggests that many females drive even though they perceive a high level of risk when driving. It could be considered that many Australian women drive because of necessity rather than a choice; due to the unavailability of alternative forms of transport and distance. In countries where driving is less necessary and alternative modes of transport are more available, less females drive and more females cycle.

Furthermore, the higher level of risk associated with on-road travel perceived by females may be considered a more balanced and accurate perspective of safety within the Australian road environment (Gilligan, 1982). Thus, while females repeatedly identify safety concerns, it may remain difficult for males to fully comprehend the level of safety required to encourage female participation in cycling. Alternatively it is possible that the risk perceived by females in Australia may have been influenced and augmented by cultural and social learning (Horton, et al., 2008; Wetherell, 1996). Therefore making cycling objectively (and subjectively) safer may not remove gender differences in cycling participation and practices unless other factors and social norms are also addressed.

References

Aarts, H., Verplanken, B., & van Knippenberg, A. (1998). Predicting Behavior From Actions in the Past: Repeated Decision Making or a Matter of Habit? *Journal of Applied Social Psychology, 28*(15), 1355. Retrieved from http://dx.doi.org/10.1111/j.1559-1816.1998.tb01681.

af Wåhlberg, A. (2009). *Driver Behaviour and Accident Research Methodology: Unresolved Problems*.

Aultman-Hall, L., Hall, F., & Baetz, B. (1997). Analysis of Bicycle Commuter Routes Using Geographic Information Systems: Implications for Bicycle Planning. *Transportation Research Record: Journal of the Transportation Research Board, 1578*(-1), 102-110. Retrieved from http://dx.doi.org/10.3141/1578-13. doi:10.3141/1578-13

Australian Bureau of Statistics. (2011). *Socio-economic Indexes for Areas (SEIFA), Data Cube only 2011*. Canberra: Australian Government Retrieved from http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/2033.0.55.0012006.

Australian Transport Safety Bureau. (2006). *Deaths of cyclists due to road crashes.* Canberra: Australian Government Retrieved from www.infrastructure.gov.au/.../2006/death_cyclists_road.aspx.

Aven, T. (2010). On how to define, understand and describe risk. *Reliability Engineering; System Safety, 95*(6), 623-631. Retrieved from http://www.sciencedirect.com/science/article/pii/S095183201000027X. doi:10.1016/j.ress.2010.01.011

Aven, T., & Kristensen, V. (2005). Perspectives on risk: review and discussion of the basis for establishing a unified and holistic approach. *Reliability Engineering; System Safety, 90*(1), 1-14. Retrieved from http://www.sciencedirect.com/science/article/pii/S0951832004002583. doi:10.1016/j.ress.2004.10.008

Biegler, P., Newstead, S., Johnson, M., Taylor, J., Mitra, B., & Bullen, S. (2012). *Monash Alfred Cyclist Crash Study (MACCS)*. Retrieved from http://www.bayside.vic.gov.au/documents/Monash_Alfred_Crash_Study.pdf

Bíl, M., Bílová, M., & Müller, I. (2010). Critical factors in fatal collisions of adult cyclists with automobiles. *Accident Analysis & Prevention*, *42*(6), 1632-1636. Retrieved from http://www.sciencedirect.com/science/article/pii/S000145751000103X. doi:10.1016/j.aap.2010.04.001

Bonham, J., & Wilson, A. (2012). Bicycling and the Life Course: The Start-Stop-Start Experiences of Women Cycling. *International Journal of Sustainable Transportation*, *6*(4), 195-213. Retrieved from http://www.tandfonline.com.ezp01.library.qut.edu.au/doi/full/10.1080/15568318.2011.585219.

Bureau of Infrastructure Transport and Regional Economics. (2013). *Road deaths Australia October 2013.* Australian Government Retrieved from http://www.bitre.gov.au/publications/ongoing/rda/files/RDA_Oct2013.pdf.

Bureau of InfrastructureTransport and Regional Economics. (2010). *Road deaths Australia December 2010.* Canberra: Australian Government Retrieved from http://www.bitre.gov.au/publications/ongoing/rda/files/RDA_1210.pdf.

Bureau of InfrastructureTransport and Regional Economics. (2013). *Road deaths Australia 2012 Statistical Summary.* Canberra: Australian Government Retrieved from http://www.bitre.gov.au/publications/ongoing/files/RDA_Summary_2012_June.pdf.

Byrnes, J. P., Miller, D. C., & Schafer, W. D. (1999). Gender differences in risk taking: A meta-analysis. *Psychological Bulletin, 125*(3), 367-383. Retrieved from =http://search.ebscohost.com/login.aspx?direct=true&db=pdh&AN=1999-13573-004&site=ehost-live. doi:10.1037/0033-2909.125.3.367

Chaurand, N., & Delhomme, P. (2013). Cyclists and drivers in road interactions: A comparison of perceived crash risk. *Accident Analysis & Prevention, 50*, 1176-1184. Retrieved from http://www.sciencedirect.com/science/article/pii/S0001457512003120. doi:http://dx.doi.org/10.1016/j.aap.2012.09.005

De Rome, L., Boufous, S., Senserrick, T., Richardson, D., & Ivers, R. (2011). *The Pedal Study: Factors Associated With Bicycle Crashes And Injury Severity In The Act Final Report July 2011*. Retrieved from www.roadsafetytrust.org.au/c/rtt?a=sendfile&ft=p&fid=1330472150&sid=

DeJoy, D. (1990). An examination of gender differences in traffic accident risk perception. *Accident Analysis & Prevention, 24*(3), 237-246. Retrieved from http://www.sciencedirect.com.ezp01.library.qut.edu.au/science/article/pii/0001457592900032.

Department of Infrastructure and Regional Development. (2013). *Roads, Road Safety*. Retrieved from http://www.infrastructure.gov.au/roads/safety/index.aspx.

Department of Transport and Main Roads. (2011). *Connecting SEQ 2031 – An Integrated Regional Transport Plan for South East Queensland.* Brisbane: Queensland Government Retrieved from http://www.tmr.qld.gov.au/Projects/Name/C/Connecting-SEQ-2031.aspx.

Department of Transport and Main Roads. (2014, 17.10.2014). Bicycle road rules. Retrieved 22.10.2014, 2014from Queensland Government, http://www.tmr.qld.gov.au/Safety/Queensland-road-rules/Bicycle-rules.aspx

Elvik, R. (2009). The non-linearity of risk and the promotion of environmentally sustainable transport. *Accident Analysis & Prevention, 41*(4), 849-855. Retrieved from http://www.sciencedirect.com/science/article/pii/S0001457509000876. doi:10.1016/j.aap.2009.04.009

Elvik, R., Vaa, T., & Erke, A. (2009). *The Handbook of Road Safety Measures*. Retrieved from http://QUT.eblib.com.au/patron/FullRecord.aspx?p=471090

Félonneau, M.-L., Causse, E., Constant, A., Contrand, B., Messiah, A., & Lagarde, E. (2013). Gender stereotypes and superior conformity of the self in a sample of cyclists. *Accident Analysis & Prevention, 50,* 336-340. Retrieved from http://www.sciencedirect.com/science/article/pii/S0001457512001583. doi:http://dx.doi.org/10.1016/j.aap.2012.05.006

Field, A. (2009). *Discovering Statistics Using SPSS* (3 ed. Vol. 1). London: SAGE.

Fishman, E., Washington, S., & Haworth, N. (2012). Understanding the fear of bicycle riding in Australia. *Journal of the Australiasian College of Road Safety, 23*(3), 19-27. Retrieved from http://search.informit.com.au.ezp01.library.qut.edu.au/documentSummary;dn=772959788443259;res=IELHEA.

Fleiter, J., & Watson, B. (2006). The speed paradox: the misalignment between driver attitudes and speeding behaviour. *Journal of the Australiasian College of Road Safety, 17*(2), 23-30. Retrieved from http://eprints.qut.edu.au/3892/.

Freeman, J., af Wåhlberg, A., Watson, B., Barraclough, P., McMaster, M., & Davey, J. (2014). The Consistency of Crash Involvement Recall across Time In L. Horn (Ed.), *Driver Behaviour and Training, Vol 6. Human Factors in Road and Rail Safety* (Vol. 6). Aldershot: Ashgate.

Gardner, C. B. (1980). Passing by: Street remarks, address rights, and the urban female. *Sociological Inquiry, 50*(3-4), 328-256. Retrieved from http://onlinelibrary.wiley.com.ezp01.library.qut.edu.au/doi/10.1111/j.1475-682X.1980.tb00026.

Garrard, J., Crawford, S., & Hakman, N. (2006). *Revolutions for Women: Increasing women's participation in cycling for recreation and transport*. Retrieved from http://search.informit.com.au.ezp01.library.qut.edu.au/documentSummary;dn=455135623756948;res=IELHEA

Garrard, J., Greaves, S., & Ellison, A. (2010). Cycling injuries in Australia: Road safety's blind spot. *Journal of the Australiasian College of Road Safety*(August 2010). Retrieved from http://search.informit.com.au.ezp01.library.qut.edu.au/documentSummary;dn=344729582861979;res=IELHEA.

Garrard, J., Handy, S., & Dill, J. (2012). Women and Cycling. In J. Pucher & R. Buehler (Eds.), *City Cycling*. Cambridge: MIT Press.

Garrard, J., Rose, G., & Kai, L. S. (2008). Promoting transportation cycling for women: The role of bicycle infrastructure. *Preventive Medicine, 46*, 55 -59. Retrieved from http://www.sciencedirect.com.ezp01.library.qut.edu.au/science/article/pii/S0091743507003039.

Gatersleben, B., & Haddad, H. (2010). Who is the typical bicyclist? *Transportation Research Part F: Traffic Psychology and Behaviour, 13*(1), 41-48. Retrieved from http://www.sciencedirect.com/science/article/pii/S1369847809000643. doi:http://dx.doi.org/10.1016/j.trf.2009.10.003

Gierlach, E., Belsher, B. E., & Beutler, L. E. (2010). Cross-Cultural Differences in Risk Perceptions of Disasters. [Article]. *Risk Analysis: An International Journal, 30*(10), 1539-1549. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=bsh&AN=54326617&site=ehost-live. doi:10.1111/j.1539-6924.2010.01451.x

Gilligan, C. (1982). *In a Different Voice*. Cambridge: Harvard University Press.

Greaves, S. P., & Ellison, A. B. (2011). Personality, risk aversion and speeding: An empirical investigation. *Accident Analysis & Prevention, 43*(5), 1828-1836. Retrieved from http://www.sciencedirect.com/science/article/pii/S0001457511000996. doi:http://dx.doi.org/10.1016/j.aap.2011.04.018

Greening, L., Stoppelbein, L., Chandler, C., & Elkin, T. (2005). Predictors of Children's and Adolescents' Risk Perception. *J. Pediatric Psychology, 30*(5), 425 -435. Retrieved from http://jpepsy.oxfordjournals.org/content/30/5/425.

Grundy, C. (2009). Effect of 20 mph traffic speed zones on road injuries in London, 1986-2006: controlled interrupted time series analysis. *British medical journal (Clinical research ed.), 339*(dec10 3). Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2791801.

Gustafson, P. E. (1998). Gender Differences in Risk Perception: Theoretical and Methodological Perspectives. *Risk Analysis 18*(6), 805 - 811. Retrieved from http://onlinelibrary.wiley.com.ezp01.library.qut.edu.au/doi/10.1111/j.1539-6924.1998.tb01123.x/pdf.

Harris, C. R., Jenkins, M., & Glaser, D. (2006). Gender differences in risk assessment: Why do women take fewer risks than men? *Judgment and Decision Making, 1*(1), 48. Retrieved from ProQuest Central.Retrieved from http://gateway.library.qut.edu.au/login?url=http://search.proquest.com/docview/1010959354?accountid=13380

Haworth, N., & Debnath, A. K. (2013). How similar are two-unit bicycle and motorcycle crashes? *Accident Analysis & Prevention, 58*(0), 15-25. Retrieved from http://www.sciencedirect.com/science/article/pii/S0001457513001498. doi:http://dx.doi.org/10.1016/j.aap.2013.04.014

Haworth, N., & Schramm, A. (2011). How Do Level of Experience, Purpose for Riding, and Preference for facilities Affect Location of Riding? Study of Adult Bicycle Riders in Queensland, Australia. *Transportation Research Record: Journal of the Transportation Research Board, 2247 - 2011*, 17 - 23. Retrieved from http://trb.metapress.com.ezp01.library.qut.edu.au/content/h4642200377w37j2/?genre=article&id=doi%3a10.3141%2f2247-03. doi:10.3141/2247-03

Haworth, N., Schramm, A., King, M., & Steinhardt, D. (2010, November 2010). *Bicycle Helmet Research, CARRS-Q Monograph 5.* Retrieved from http://qut.summon.serialssolutions.com/search?s.q=Bicycle+helmet+research

Hayakawa, H., Fishbeck, P., & Fischoff, B. (2000). Traffic accident statistics and risk perceptions in Japan and the United States. *Accident Analysis & Prevention, 32*, 827-835. Retrieved from http://www.sciencedirect.com.ezp01.library.qut.edu.au/science/article/pii/S0001457500000075.

Heesch, K. C., Garrard, J., & Sahlqvist, S. (2011). Incidence, severity and correlates of bicycling injuries in a sample of cyclists in Queensland, Australia. *Accident Analysis and Prevention, 43*, 5. Retrieved from http://www.sciencedirect.com.ezp01.library.qut.edu.au/science/article/pii/S0001457511001606.

Heesch, K. C., Sahlqvist, S., & Garrard, J. (2011). Cyclists' experiences of harassment from motorists: Findings from a survey of cyclists in Queensland, Australia. *Preventive Medicine, 53*(6), 417-420. Retrieved from http://www.sciencedirect.com/science/article/pii/S0091743511003847. doi:10.1016/j.ypmed.2011.09.015

Heesch, K. C., Sahlqvist, S., & Garrard, J. (2012). Gender differences in recreational and transport cycling: a cross-sectional mixed-methods comparison of cycling patterns, motivators, and constraints. *International Journal of Behavioral Nutrition and Physical Activity, 9,* 106. Retrieved from ProQuest Central.Retrieved from http://gateway.library.qut.edu.au/login?url=http://search.proquest.com/docview/1178938467.

Henley, G., & Harrison, J. E. (2011). Trends in serious injury due to land transport accidents, Australia 2000–01 to 2007–08. *Injury Research and Statistics Series, 54* Retrieved from http://www.aihw.gov.au/publication-detail/?id=10737418595.

Henley, G., & Harrison, J. E. (2012). *Serious injury due to land transport accidents, Australia 2008–09.* Canberra: Australian Institute of Health and Welfare Retrieved from http://www.aihw.gov.au/publication-detail/?id=10737421997.

Henwood, K. L., Parkhill, K. A., & Pidgeon, N. F. (2008). Science, technology and risk perception. *Equal Opportunities International, 27*(8), 662-676. Retrieved from ProQuest Central.Retrieved from http://search.proquest.com/docview/199675757?accountid=13380

Horton, D., Rosen, P., & Cox, P. (2008). Cycling and Society. *Journal of Transport Geography, 16*(4), 300-301. Retrieved from http://www.sciencedirect.com/science/article/pii/S0966692308000288. doi:http://dx.doi.org/10.1016/j.jtrangeo.2008.04.001

Hunter, W., Harkey, D., Stewart, J., & Birk, M. (2000). Evaluation of blue bike-lane treatment in Portland, Oregon. In *Pedestrian and Bicycle Transportation Research 2000* (pp. 107 - 115). Washington: Transportation Research Board Natl Research Council.

Jensen, S. U. (2008). Safety effects of blue cycle crossings: A before-after study. *Accident Analysis & Prevention, 40*(2), 742-750. Retrieved from http://www.sciencedirect.com/science/article/pii/S0001457507001649. doi:10.1016/j.aap.2007.09.016

Johnson, M., Newstead, S., Charlton, J., & Oxley, J. (2011). Riding through red lights: The rate, characteristics and risk factors of non-compliant urban commuter cyclists. *Accident Analysis & Prevention, 43*(1), 323-328. Retrieved from http://www.sciencedirect.com/science/article/pii/S0001457510002630. doi:10.1016/j.aap.2010.08.030

Jonah, B. A. (1997). Sensation seeking and risky driving: a review and synthesis of the literature. *Accident Analysis & Prevention, 29*(5), 651-665. Retrieved from http://www.sciencedirect.com/science/article/pii/S0001457597000171.

Kalof, L., Dietz, T., & Guagnano, G. (2002). Race, Gender and Environmentalism: The Atypical Values and Beliefs of White Men. *Gender and Class 9*(2), 1112. Retrieved from http://search.proquest.com/docview/218826193?accountid=13380

Kim, K. (2000). Differences between male and female involvment in motor vehicle collisions in Hawaii. *Womens Travel Issues: Proceedings from the Second National conference,, October 1996*, 518-528. Retrieved from http://www.fhwa.dot.gov/ohim/womens/chap27.pdf.

Krizek, K. J. (2006). Two Approaches to Valuing Some of Bicycle Facilities' Presumed Benefits. *Journal of the American Planning Association, 72*(3), 309-320. Retrieved from http://search.proquest.com.ezp01.library.qut.edu.au/docview/229649207.

Laapotti, S. (2004). *What are young female drivers made of? Differences in driving behaviour and attitudes of young women and men in Finland*. Paper presented at Research on Women's issues in Transportation 35, Chicago, Illinois.

Lajunen, T., & Ozkan, T. (2011). Self-Report Instruments and Methods. In B. E. Porter (Ed.), *Handbook of Traffic Pschology* (pp. 43 - 57): Elsevier Science.

Lajunen, T., & Räsänen, M. (2001). Why teenagers owning a bicycle helmet do not use their helmets. *Journal of Safety Research, 32*(3), 323-332. Retrieved from http://www.sciencedirect.com/science/article/pii/S0022437501000561. doi:http://dx.doi.org/10.1016/S0022-4375(01)00056-1

Lund, I. O., & Rundmo, T. (2009). Cross-cultural comparisons of traffic safety, risk perception, attitudes and behaviour. *Safety Science, 47*(4), 547-553. Retrieved from http://www.sciencedirect.com/science/article/pii/S0925753508001094. doi:10.1016/j.ssci.2008.07.008

Lupton, D. (1999). *Risk*. Florence: Routledge.

Martha, C., & Delhomme, P. (2009). Risk comparative judgments while driving a car among competitive road cyclists and non-cyclists. *Transportation Research Part F: Traffic Psychology and Behaviour, 12*(3), 256-263. Retrieved from http://www.sciencedirect.com/science/article/pii/S1369847808000995. doi:10.1016/j.trf.2008.11.004

Matthies, E., Kuhn, S., & Klockner, C. A. (2002). Travel mode choice of women: The result of limitation, ecological norm, or weak habit? . *Environment and Behavior, 34*(2), 163-177. Retrieved from http://eab.sagepub.com.ezp01.library.qut.edu.au/content/34/2/163. doi:10.1177/0013916502034002001

Mayhew, D. R., Ferguson, S. A., Desmond, K. J., & Simpson, H. M. (2003). Trends in fatal crashes involving female drivers, 1975–1998. *Accident Analysis &*

Prevention, 35(3), 407-415. Retrieved from http://www.sciencedirect.com/science/article/pii/S0001457502000192.

McKenna, F., Stanier, R., & Lewis, C. (1990). Factors underlying illusory self-assessment of driving skill in males and females. *Accident Analysis & Prevention, 23*(1), 45-52. Retrieved from http://www.sciencedirect.com.ezp01.library.qut.edu.au/science/article/pii/0001457591900343.

National Heart Foundation. (2013a). Hearts-and-Minds-Fact-Sheet. from The heart foundation http://www.heartfoundation.org.au/SiteCollectionDocuments/Hearts-and-Minds-Fact-Sheet.pdf

National Heart Foundation. (2013b). *Women and cycling survey 2013*: Heart Foundation,. Retrieved from www.heartfoundation.org.au/news-media/Media-Releases-2013/...

Norton, L., Henley, G., & Harrison, J. (2010). Trends in cycling injuries 2000–2008. *Journal of Science and Medicine in Sport, 13, Supplement 1*(0), e41. Retrieved from http://www.sciencedirect.com/science/article/pii/S1440244010007504. doi:http://dx.doi.org/10.1016/j.jsams.2010.10.549

O'Connor, J. P., & Brown, T. D. (2010). Riding with the sharks: Serious leisure cyclist's perceptions of sharing the road with motorists. *Journal of Science and Medicine in Sport, 13*(1), 53-58. Retrieved from ProQuest Central.Retrieved from http://gateway.library.qut.edu.au/login?url=http://search.proquest.com/docview/216671794?accountid=13380.

Office of Economic and Statistical Research. (2010). *Participation in Sport and Physical Recreation, Australia, 2009–10.* Queensland Government Retrieved from http://www.abs.gov.au/ausstats/abs@.nsf/mf/4177.0.

Oltedal, S., & Rundmo, T. (2006). The effects of personality and gender on risky driving behaviour and accident involvement. *Safety Science, 44*(7), 621-628. Retrieved from http://www.sciencedirect.com.ezp01.library.qut.edu.au/science/article/pii/S0925753505001864.

Ozkan, T., & Lajunen, T. (2006). What causes the differences in driving between young men and women? The effects of gender roles and sex on young drivers' driving behaviour and self-assessment of skills. *Transportation Research Part F: Traffic Psychology and Behaviour, 9*, 269-277. Retrieved from http://www.sciencedirect.com/science/article/pii/S1369847806000167.

Pink, B. (2011). *Socio-Economic Indexes for Areas (SEIFA), Technical Paper.* Canberra: Australian Government Retrieved from http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/22CEDA8038AF7A0DCA257B3B00116E34/$File/2033.0.55.001%20seifa%202011%20technical%20paper.pdf.

Pucher, J., & Buehler, R. (2008). Cycling for Everyone Lessons from Europe. *Transportation Research Record: Journal of the Transportation Research Board, 2074*, 58. Retrieved from http://trb.metapress.com/content/n68p320p48113631/.

Pucher, J., Dill, J., & Handy, S. (2010). Infrastructure, programs, and policies to increase bicycling: An international review. *Preventive Medicine, 50, Supplement*(0), S106-S125. Retrieved from http://www.sciencedirect.com/science/article/pii/S0091743509004344. doi:http://dx.doi.org/10.1016/j.ypmed.2009.07.028

Queensland Government. (2011). *Connecting SEQ 2031 – An Integrated Regional Transport Plan for South East Queensland.* Brisbane.

Räsänen, M, & Summala, H. (1998a). Attention and Expectation Problems in Bicycle-car Collisions: an In-Depth Study. *Accident Analysis & Prevention, 30*(5), 657 - 666. Retrieved from http://www.sciencedirect.com/science/article/pii/S0001457598000074.

Räsänen, M., & Summala, H. (1998b). Attention and expectation problems in bicycle–car collisions: an in-depth study. *Accident Analysis & Prevention, 30*(5), 657-666. Retrieved from http://www.sciencedirect.com/science/article/pii/S0001457598000074.

Reynolds, C., Harris, M. A., Teschke, K., & Cripton, P. A. (2009). The impact of transportation infrastructure on bicycling injuries and crashes: a review of the literature. *Environmental Health, 8*(47), 5. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2776010/. doi:`10.1186/1476-069X-8-47

Rissel, C., Bonfiglioli, C., Emilsen, A., & Smith, B. (2010). Representations of cycling in metropolitan newspapers - changes over time and differences between Sydney and Melbourne, Australia. *BMC Public Health, 10*(371), 8. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2912807/.

Rissel, C., Campbell, F., Ashley, B., & Jackson, L. (2002). Driver Road Rule Knowledge and Attitudes towards Cyclists. *Australian Journal of Primary Health, 8*(2), 66-69. Retrieved from http://www.publish.csiro.au/paper/PY02029.

Rohrmann, B., & Chen, H. (1999). Risk perception in China and Australia: an exploratory crosscultural study. *Journal of Risk Research, 2*(3), 219-241. Retrieved from http://dx.doi.org/10.1080/136698799376817.

Salmon, P. M., Young, K. L., & Cornelissen, M. (2013). Compatible cognition amongst road users: The compatibility of driver, motorcyclist, and cyclist situation awareness. *Safety Science, 56,* 6-17. Retrieved from http://www.sciencedirect.com/science/article/pii/S0925753512000756. doi:http://dx.doi.org/10.1016/j.ssci.2012.02.008

Schepers, J. P., Kroeze, P. A., Sweers, W., & Wüst, J. C. (2011). Road factors and bicycle–motor vehicle crashes at unsignalized priority intersections. *Accident Analysis & Prevention, 43*(3), 853-861. Retrieved from http://www.sciencedirect.com/science/article/pii/S0001457510003350. doi:10.1016/j.aap.2010.11.005

Schramm, A., Rakotonirainy, A., & Haworth , N. (2010). The Role of Traffic Violations in Police-reported Bicycle Crashes in Queensland. *Journal of the Australasian College of Road Safety, 21*(3), 61-67. Retrieved from http://search.informit.com.au/documentSummary;dn=344804114747011;res=IELENG.

Sener, I. N., Naveen, E., & Bhat, C. R. (2009). An analysis of bicycle route choice preferences in Texas, US. *Transportation, 36*, 511 - 539. Retrieved from http://search.proquest.com.ezp01.library.qut.edu.au/docview/212426307. doi:10.1007/s11116-009-9201-4

Sjoberg, L., Moen, B., & Rundmo, T. (2004). Explaining risk perception. An evaluation of the psychometric paradigm in risk perception research. *Rotunde, 84*, 30. Retrieved from http://paul-hadrien.info/backup/LSE/IS%20490/utile/Sjoberg%20Psychometric_paradigm.pdf.

Sorensen, M., & Mosslemi, M. (2009). Subjective and Objective Safety. Retrieved from The Research Council of Norway, https://www.toi.no/getfile.php/Publikasjoner/T%C3%98I%20rapporter/2009/1009-2009/1009-2009-nett.pdf

Transport and Main Roads. (2011). *2010 Year in Review Road Crash Report, 2011*. Queensland Government.

Wahlberg, A., & Sjoberg, L. (2000). Risk perception and the media. *Journal of Risk Research, 3*(1), 31-50. Retrieved from eoah.Retrieved from url=http://search.ebscohost.com/login.aspx?direct=true&db=eoah&AN=320472&site=ehost-live.

Washington, S., Haworth, N., & Schramm, A. (2012). Relationships between self-reported bicycling injuries and perceived risk among cyclists in Queensland, Australia. *Transportation Research Record*(No.2314), 57-65.

Watson, L., & Cameron, M. (2006). *Bicycle and Motor Vehicle Crash Characteristics: 2000 to 2004 Data*. Retrieved from http://www.monash.edu.au/miri/research/reports/muarc251.pdf

Wetherell, M. (1996). Linguistic repertoires and literary criticism: new directions in the social psychology of gender. In M. Gergen & S. Davis (Eds.), *Toward a New Psychology of Gender: A Reader* (pp. 149–170). London: Routledge.

Winters, M., Davidson, G., Kao, D., & Kay, T. (2010). Motivators and deterrents of bicycling: comparing influences on decisions to ride. *Transportation 38*(1), 153 - 168. Retrieved from http://search.proquest.com.ezp01.library.qut.edu.au/docview/820828564.

Winters, M. P., Babul, S. P., Becker, H. J. M., Brubacher, J. R. M. D. M., Chipman, M. P., Cripton, P. P., . . . Teschke, K. P. (2012). Safe Cycling: How Do Risk Perceptions Compare With Observed Risk? *Canadian Journal of Public Health, 103*(Supplement 3), S42-S47. Retrieved from ProQuest Central.Retrieved from http://search.proquest.com/docview/1287948159?accountid=13380

Appendix A

Judging accident risk at intersections for car drivers and cyclists

This project is being undertaken as part of Masters Study for Wanda Griffin at The Centre for Accident Research and Road Safety, Queensland (CARRS _ Q), Queensland University of Technology.
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Page 1 of 19

PARTICIPATE IN RESEARCHInformation for Prospective Participants

The following research activity has been reviewed via QUT arrangements for the conduct of research involving human participation.
Judging accident risk at intersections for car drivers and cyclists.

Research Team Contacts

Principal Researcher: Wanda Griffin – Master of Applied Science student – Centre for Accident Research and Road Safety–Queensland (CARRS–Q) – Queensland University of Technology (QUT)
ph 07 31387749 wanda.griffin@student.qut.edu.au

Associate Researcher: Professor Narelle Haworth – QUT School of Psychology and Counseling – Faculty of Health – CARRS–Q

Please contact the researcher team members to have any questions answered or if you require further information about the project.
What is the purpose of the research?

A change in the way we travel, from individual car use to active transport in particular cycling and walking, has been identified as a way to improve the health of the population, environment and economy. State government strategies aim to increase the percentage of commuter trips made by bicycle in Brisbane, from 1.6% in 2006 to 20% by 2031 (Queensland Government. 2011) For this adjustment of the cities roads dynamics to safely occur, changes in both road infrastructure and road user expectations and behaviors will be needed.
The purpose of this research is to investigate factors affecting cyclist safety at intersections, one of the road environments where cyclists are most at risk. This research will examine how you as a cyclist or a car driver experience travelling on the road through the urban environment. By gathering your valuable knowledge we can gain a greater understanding about the risk you feel when interacting with various modes of transport in a range of traffic situations. This information can inform the development of road safety strategies and guide the redesign of roadways as increasing numbers of cyclists change the traffic dynamics in the future.

Are you looking for people like me?

The research team is looking for two groups of participants –cyclists (people who cycle regularly at least once a week) and drivers (who drive a car regularly at least once a week). You have been invited to participate in this project because we are looking for people over 17 with a car driver's license who live in a major city or inner regional centre.

What will you ask me to do?

Your participation will involve completing an on line survey that should take approximately 20 minutes to complete. The survey is made up of the same series of questions that have been adapted to the viewpoint of either a driver or a cyclist depending on your choice of transport. If you agree to participate you do not have to either a driver or a cyclist depending on your choice of transport. If you agree to participate you do not have to complete any question(s) that you feel uncomfortable answering. Some questions will ask you to imagine you are in a number of different traffic scenarios for example: It's the beginning of the afternoon and the weather is fine you are on your bike (driving your car) alone. You're riding (driving) in a built-up area.

Example questions: In your opinion, what is the probability that you will have an accident riding on your bike/ driving your car in the next 3 years, if:

Another rider fails to give way to you at a X intersection (four legged intersection)

A car driver fails to give way to you at a X intersection

You fail to give way to a car at a X intersection

Very Unlikely – Unlikely – Neither Unlikely or Likely – Likely – Very LikelyOn average how far do you drive each week? Less than 10 km – between 10 km and less than 50 km – between 50 km and less than 100 km – between 100 km and less than 200 km – between 200 km and less than 300 km – between 300 km and less than 400 km – 400km and more

Your participation in this project is entirely voluntary. If you do agree to participate, you can withdraw from the project while completing the questionnaire. Once completed it will not be possible to withdraw submitted information as responses are anonymous and non identifiable. Your decision to participate or not participate will in no way impact upon your current or future relationship with the QUT.

Are there any risks for me in taking part?The research team has identified the following possible risks in relation to participating in this study: This study is investigating issues/aspects relating to cyclist safety on the roads. It contains questions focused on gathering your viewpoint about your possible involvement in a crash if you experienced an interaction with another road user (car or bicycle) in various traffic scenarios. If yourself or someone you know has experienced a negative experience in relation to riding (e.g. been involved in a crash), you may find the topic to be a sensitive one and we would ask that you consider whether you are comfortable participating.

Also included in the survey are some questions relating to potential illegal behaviours, ie failing to give way, not wearing a helmet or seat belt. Please note that as survey answers are anonymous even if you have been involved in behaviours that break the law, eg received speeding fines, you will not be identifiable through participation in this survey.

QUT also provides for limited free counselling for research participants of QUT projects who may experience discomfort or distress as a result of their participation in the research. Should you wish to access this service please contact the Clinic Receptionist of the QUT Psychology Clinic on 3138 0999. Please indicate to the receptionist that you are a research participant.

Privacy and Confidentiality

All comments and responses are anonymous and will be treated confidentially. The names of individual persons are not required in any of the responses. Email / phone contact details for the prize draw will be collected separately at the conclusion of questionnaire and this information will not be used for any other purposes then the prize draw.The prizes will be drawn at the conclusion of the survey and only the five randomly chosen winners will be contacted to arrange delivery of each the five $100 Coles/Myer vouchers. Contact details will be destroyed once all vouchers have been claimed. Any data collected as part of this project will be stored securely as per QUT Management of research data policy.

project will be stored securely as per QUT Management of research data policy.

Concerns and Complaints Regarding the the Conduct of the Project
QUT is committed to research integrity and the ethical conduct of research projects. However, if you do have any concerns or complaints about the ethical conduct of the project you may contact the QUT Research Ethics Unit on 07 3138 5123 or email ethicscontact@qut.edu.au. The QUT Research Ethics Unit is not connected with the research project and can facilitate a resolution to your concern in an impartial manner.

Are there any benefits for me in taking part?

It is expected that this project will not benefit you directly. However it may benefit the community through the design of a safer more sustainable transport network. This study aims to increase the available knowledge about cycling in regard to road user risk perception and safety behaviours. This beneficial information can guide the development of safety programs designed to guide the road user in adapting to sharing the road with high numbers of cyclists.

Will I be compensated for my time?

To recognise your contribution should you choose to participate, the research team is offering you the chance to win one of five $100 Coles/Myer gift vouchers.
Randomly drawn at the conclusion of the survey which will be at the latest the 30 of May, 2013. Thank You!

QUT Ethics Approval Number:1200000528

I have understood the above information and agree to participate

- ○ Yes
- ○ No

Do you have a driving licence?

- ○ Yes
- ○ No

How often do you ride a bicycle?

- ○ Never
- ○ Less than once a month
- ○ 1 to 3 times a month
- ○ Once a week
- ○ 2 or 3 times a week
- ○ 4 to 6 times a week
- ○ At least once a day

Page 4 of 19

Cyclist Survey

How often do you use a bicycle to travel around town, for example to travel to work, do your shopping, etc.?

- Never
- Less than once a month
- 1 to 3 times a month
- Once a week
- 2 or 3 times a week
- 4 to 6 times a week
- At least once a day

In the following questions, please imagine that you are in the following situation:

It's the beginning of the afternoon, it's fine weather. You are on your bike, alone and you're riding in a built-u area.

For each question, click on the circle corresponding to your response.

An X intersection is where two roads cross to create a four legged intersection.

In your opinion, how likely is it that you will have an accident on your bike in the next 3 years, if:

	Very unlikely	Unlikely	Neither likely or unlikely	Likely	Very likely
a. Another rider fails to give way to you at a X intersection (four legged intersection)	○	○	○	○	○
b. A car driver fails to give way to you at a X intersection	○	○	○	○	○
c. You fail to give way to a car at a X intersection	○	○	○	○	○

In your opinion, how likely is it that you will have an accident on your bike in the next 3 years, if:

	Very unlikely	Unlikely	Neither likely or unlikely	Likely	Very likely
a. You are riding through a X intersection (four legged intersection) on a green signal when another rider on the road to your left runs the red light towards you	○	○	○	○	○
b. You are riding through a X intersection on a green signal when a car driver on the road to your left runs the red light towards you	○	○	○	○	○
c. You run the red light at a X intersection while a car with a green signal is driving through the intersection	○	○	○	○	○

It's the beginning of the afternoon, it's fine weather. You are on your bike, alone and you're riding in a built-u[p]
area.

In your opinion, what is the probability that you will have an accident on your bike in the next 3 years, if:

	Very unlikely	Unlikely	Neither likely or unlikely	Likely	Very likely
a. At a X intersection, another rider in front of you brakes and turns into a driveway without indicating	O	O	O	O	O
b. At a X intersection, a car in front of you brakes and turns into a driveway without indicating	O	O	O	O	O
c. At a X intersection, you brake and turn into a driveway without indicating when there is a car behind you	O	O	O	O	O

In your opinion, what is the probability that you will have an accident on your bike in the next 3 years, if:

	Very unlikely	Unlikely	Neither likely or unlikely	Likely	Very likely
a. In a right hand-hand curve, another rider coming the other way is going too fast and crosses over the centre line	O	O	O	O	O
b. In a right-hand curve, a car coming the other way is going too fast and crosses over the centre line	O	O	O	O	O
c. In a left-hand curve, you are going too fast and cross the centre line into the path of a car coming the other way	O	O	O	O	O

In your opinion, what is the probability that you will have an accident on your bike in the next 3 years, if:

	Very unlikely	Unlikely	Neither likely or unlikely	Likely	Very likely
a. Another rider is too close behind you when you are forced to brake suddenly	O	O	O	O	O
b. A car is too close behind you when you are forced to brake suddenly	O	O	O	O	O
c. You are too close behind a car when the car driver is forced to brake suddenly	O	O	O	O	O

Page 6 of 19

It's the beginning of the afternoon, it's fine weather. You are on your bike, alone and you're riding in a built-u| area.

In your opinion, what is the probability that you will have an accident on your bike in the next 3 years, if:

	Very unlikely	Unlikely	Neither likely or unlikely	Likely	Very likely
a. You ride through a Give Way sign at an intersection and another rider on the road to your left, who has right of way, turns right across your path without looking towards you					
b. You ride through a Give Way sign at an intersection and a car on the road to your left, who has right of way, turns right across your path without looking towards you					
c. You are turning right at an intersection without looking to the right and a car comes through a Give Way sign to your right towards you					

In your opinion, what is the probability that you will have an accident on your bike in the next 3 years, if:

	Very unlikely	Unlikely	Neither likely or unlikely	Likely	Very likely
a. You have to brake suddenly on dry leaves					
b. You have to brake suddenly during heavy rain					
c. You are blinded by sun glare					
d. You have to brake suddenly on gravel					

How often do you do each of the following actions when you are riding a bike?

	Never	Rarely	Sometimes	Often	Very Often
Fail to give way at a X intersection					
Run a red light at a X intersection					
Not make a hand signal when you are going to turn					
Cross into the opposing lane when you are in a curve					
Travel too close to the vehicle in front					
Turn right at an intersection (when you have right of way) without checking the traffic on your right					
Not wear a bicycle helmet					

When riding your bike, how well do the following statements describe you?

	Not at all	Not much	A bit	A lot	Completely
My thoughts are elsewhere	○	○	○	○	○
I have no problems adapting to the road conditions	○	○	○	○	○
I behave carefully	○	○	○	○	○
Carrying a child on my bike distracts me and interferes with my riding	○	○	○	○	○
I can ride well regardless of the amount of traffic	○	○	○	○	○
I ride confidently	○	○	○	○	○
I can ride well regardless of the weather	○	○	○	○	○
I have trouble riding at night	○	○	○	○	○
If I'm concerned about something, that can affect my riding	○	○	○	○	○
Sometimes I fail to detect motorcycles or scooters when I'm on the road	○	○	○	○	○
I am careless when I am in a hurry	○	○	○	○	○
I am able to predict what other road users will do	○	○	○	○	○
I can control my bike regardless of my speed	○	○	○	○	○
I can thread through other vehicles easily	○	○	○	○	○
I have an easy riding style	○	○	○	○	○
I can control my bike even when I'm tired	○	○	○	○	○
I have good reflexes	○	○	○	○	○

Page 8 of 19

Please indicate your level of agreement with the following statements by clicking on the appropriate circle.

	Totally disagree	Disagree	Neither agree nor disagree	Agree	Totally Agree
Speed limits are justified	○	○	○	○	○
Road safety laws should be stricter	○	○	○	○	○
Drink driving laws should be strengthened	○	○	○	○	○
The penalties for traffic offences should be increased	○	○	○	○	○
There should be more police enforcement of speed and alcohol	○	○	○	○	○
When there is no other traffic, it's not dangerous to go through a Stop sign	○	○	○	○	○
It is more important to think about your safety when you're on a long trip	○	○	○	○	○
Most of the time, there are no consequences for riding without a helmet	○	○	○	○	○
Excessive speed is one of the main causes of accidents	○	○	○	○	○
Most accidents could be avoided if people anticipated the dangers	○	○	○	○	○
Drink driving is a very dangerous behaviour	○	○	○	○	○
It is possible to have 2 or 3 beers in an hour without affecting your driving	○	○	○	○	○
Some city streets are not built for safe riding	○	○	○	○	○
In built-up areas, I always feel safe on my bike	○	○	○	○	○
I'm uncomfortable if I have to ride in heavy traffic	○	○	○	○	○
Riding in built-up areas is always stressful for me	○	○	○	○	○

Do you own a bicycle?

○ Yes

○ No

On average how much time do you spend riding each week?

	Less than 30 minutes	between 30 minutes and less than 2 hours	between 2 hours and less than 5 hours	between 5 hours and less than 10 hours	between 10 hours and less than 15 hours	15 hours and more
	○	○	○	○	○	○

In general which days of the week do you ride your bike?

- ☐ Monday
- ☐ Tuesday
- ☐ Wednesday
- ☐ Thursday
- ☐ Friday
- ☐ Saturday
- ☐ Sunday

On average how far do you ride each week?

	Less than 5 km	between 5 km and less than 20 km	between 20 km and less than 50 km	between 50 km and less than 100 km	100km and more
	○	○	○	○	○

How often do you use your bicycle for:

	Never	Sometimes	Often	Very Often
Travel to work or study	○	○	○	○
Everyday shopping	○	○	○	○
Leisure/recreation	○	○	○	○
To run errands	○	○	○	○

When you are riding your bicycle, how often do you wear a helmet?

	Never	Rarely	Often	Most of the time	Always
	○	○	○	○	○

As a bicycle rider, how many accidents have you been involved in in the last 3 years (an accident could be minor damages, a property damage-only accident, or a serious accident)?

- ○ One or more
- ○ None

If applicable, please note below for each accident the year that it occurred and its cause

1st accident: year **cause**

....

....

....

....

As a bicycle rider, how many times in the last 3 years have you been fined for breaking the road rules?

- ○ Once or more
- ○ None

If applicable, please note below for each fine the year that it occurred and the type of fine (e.g. speeding, failing to give way)

1.Year/Type of fine

....

2.Year/Type of fine

....

3.Year/Type of fine

....

4.Year/Type of fine

....

5.Year/Type of fine

....

Car Driver Survey

In the following questions, please imagine that you are in the following situation:

it's the beginning of the afternoon, it's fine weather. You are in your car, alone and you're driving in a built-up area.

For each question, click on the circle corresponding to your response.
An X intersection is where two roads cross to create a four legged intersection.

In your opinion, how likely is it that you will have an accident in the next 3 years, if:

	Very unlikely	Unlikely	Neither likely or unlikely	Likely	Very likely
a. Another car driver fails to give way to you at a X intersection (four legged intersection)	○	○	○	○	○
b. A bicycle rider fails to give way to you at a X intersection (four legged intersection)	○	○	○	○	○
c. You fail to give way to a bicycle at a X intersection (four legged intersection)	○	○	○	○	○

In your opinion, how likely is it that you will have an accident in the next 3 years, if:

	Very unlikely	Unlikely	Neither likely or unlikely	Likely	Very likely
a. You are driving through a X intersection on a green signal when another car driver on the road to your right runs the red light towards you	○	○	○	○	○
b. You are driving through a X intersection on a green signal when a bicycle on the road to your right runs the red light towards you	○	○	○	○	○
c. You run the red light at a X intersection while a bicycle with a green signal is driving through the intersection.	○	○	○	○	○

In your opinion, what is the probability that you will have an accident in the next 3 years, if:

	Very unlikely	Unlikely	Neither likely or unlikely	Likely	Very likely
a. At a X intersection, another car driver in front of you brakes and turns into a driveway without indicating	○	○	○	○	○
b. At a X intersection, a bicycle rider in front of you brakes and turns into a driveway without indicating	○	○	○	○	○
c. At a X intersection, you brake and turn into a driveway without indicating when there is a bicycle behind you	○	○	○	○	○

In your opinion, what is the probability that you will have an accident in the next 3 years, if:

	Very unlikely	Unlikely	Neither likely or unlikely	Likely	Very likely
a. In a right-hand curve, another car driver coming the other way is going too fast and crosses over the centre line into your path					
b. In a right-hand curve, a bicycle coming the other way is going too fast and crosses over the centre line into your path					
c. In a left-hand curve, you are going too fast and cross the centre line into the path of a bicycle coming the other way					

In your opinion, what is the probability that you will have an accident in the next 3 years, if:

	Very unlikely	Unlikely	Neither likely or unlikely	Likely	Very likely
a. Another car driver is too close behind you when you are forced to brake suddenly					
b. A bicycle is too close behind you when you are forced to brake suddenly					
c. You are too close behind a bicycle when the rider is forced to brake suddenly					

In your opinion, what is the probability that you will have a accident in the next 3 years, if:

	Very unlikely	Unlikely	Neither likely or unlikely	Likely	Very likely
a. You drive through a Give Way sign at a X intersection and another car driver on the road to your left, who has right of way, turns right across your path without looking towards you					
b. You drive through a Give Way sign at a X intersection and a bicycle on the road to your left, who has right of way, turns right across your path without looking towards you					
c. You are turning right at a X intersection without looking and a bicycle comes through a Give Way sign towards you					

In your opinion, what is the probability that you will have an accident in the next 3 years, if:

	Very unlikely	Unlikely	Neither likely or unlikely	Likely	Very likely
a. You have to brake suddenly on dry leaves					
b. You have to brake suddenly during heavy rain					
c. You are blinded by sun glare					
d. You have to brake suddenly on gravel					

How often do you do each of the following actions when you are driving your car?

	Never	Rarely	Sometimes	Often	Very Often
Fail to give way at a X intersection					
Run a red light at a X intersection					
Not indicate when you are going to turn					
Cross into the opposing lane when you are in a curve					
Travel too close to the vehicle in front					
Turn left at an intersection (when you have right of way) without checking the traffic on your left					
Not wear your seatbelt when you are driving					

When driving your car, how well do the following statements describe you?

	Not at all	Not much	A bit	A lot	Completely
My thoughts are elsewhere					
I have no problems adapting to the road conditions					
I behave carefully					
The presence of passengers in the car distracts me and interferes with my driving					
I can drive well regardless of the amount of traffic					
I drive confidently					
I can drive well regardless of the weather					
I have trouble driving at night					
If I'm concerned about something, that can affect my driving					
Sometimes I fail to detect motorcycles or scooters when I'm on the road					
I am careless when I am in a hurry					
I am able to predict what other road users will do					
I can control my car regardless of my speed					
I can thread through other vehicles easily					
I have an easy driving style					
I can control my car even when I'm tired					
I have good reflexes					

Page 14 of 19

Please indicate your level of agreement with the following statements by clicking on the appropriate circle.

	Totally disagree	Disagree	Neither agree nor disagree	Agree	Totally Agree
Speed limits are justified	○	○	○	○	○
Road safety laws should be stricter	○	○	○	○	○
Drink driving laws should be strengthened	○	○	○	○	○
The penalties for traffic offences should be increased	○	○	○	○	○
There should be more police enforcement of speed and alcohol	○	○	○	○	○
When there is no other traffic, it's not dangerous to go through a Stop sign	○	○	○	○	○
It is more important to think about your safety when you're on a long trip	○	○	○	○	○
Most of the time, there are no consequences for driving with out a seat belt	○	○	○	○	○
Excessive speed is one of the main causes of accidents	○	○	○	○	○
Most accidents could be avoided if people anticipated the dangers	○	○	○	○	○
Drink driving is a very dangerous behaviour	○	○	○	○	○
It is possible to have 2 or 3 beers in an hour without affecting your driving	○	○	○	○	○
Some city streets are not built for safe driving	○	○	○	○	○
In built-up areas, I always feel safe behind the wheel	○	○	○	○	○
I'm uncomfortable if I have to drive in heavy traffic	○	○	○	○	○
Driving in built-up areas is always stressful for me	○	○	○	○	○

When did you pass your driving test?

Year

....

Do you own a car?

○ Yes

○ No

How often do you drive a car?

	Never	Less than once a month	1 to 3 times a month	Once a week	2 or 3 times a week	4 to 6 times a week	A least once a day
	○	○	○	○	○	○	○

Page 15 of 19

On average how much time do you spend driving a car each week?						
	Less than 30 minutes	between 30 minutes and less than 2 hours	between 2 hours and less than 5 hours	between 5 hours and less than 10 hours	between 10 hours and less than 15 hours	15 hours and more
	○	○	○	○	○	○

On average how far do you drive each week?							
	Less than 10 km	Between 10 km and less than 50 km	Between 50 km and less than 100 km	Between 100 km and less than 200 km	Between 200 km and less than 300 km	Between 300 km and less than 400 km	400km and more
	○	○	○	○	○	○	○

How often do you use your car for:				
	Never	Sometimes	Often	Very Often
Travel to work or study	○	○	○	○
Everyday shopping	○	○	○	○
Leisure/recreation	○	○	○	○
To run errands	○	○	○	○

As a car driver, how many accidents have you been involved in the last 3 years (an accident could be minor damages, a property damage-only accident, or a serious accident)?

○ Once or more

○ None

If applicable, please note below for each accident the year that it occurred and its cause

1.Year/ Cause

....

2.Year/ Cause

....

3.Year/ Cause

....

4.Year/ Cause

....

5.Year/ Cause

....

As a car driver, how many times in the last 3 years have you been fined for breaking the road rules?

- ○ Once or more
- ○ None

If applicable, please note below for each fine the year that it occurred and the type of fine (e.g. speeding, failing to give way)

1.Year/Type of fine

....

2.Year/Type of fine

....

3.Year/Type of fine

....

4.Year/Type of fine

....

5.Year/Type of fine

....

How many demerit points have you accrued on your licence?

Number:

....

Please indicate your gender

- ○ Female
- ○ Male

Please indicate your year of birth

....

What is your occupation?

....

What is your postcode?

....

How many people live in your town/city? (Approximately)

- ○ Less than 10,000
- ○ 10,000 to 24,999
- ○ 25,000 to 99,999
- ○ 100,000 or more (not capital city)
- ○ Capital city

How many people live in the town you work or study? (Approximately)

- ○ Less than 10,000
- ○ 10,000 to 24,999
- ○ 25,000 to 99,999
- ○ 100,000 or more (not capital city)
- ○ Capital city

What is the distance in km between your home and your place of work or study?

....

Are you a member of the CARRS-Q InSPiRS Panel?

- Yes
- No

How did you find out about this survey?

- Cycling web site
- Word of mouth
- Other

Would you like to participate in the prize draw of five $100 Coles/Myer gift vouchers?
You will be required to register your contact email or phone number.
The prizes will be randomly drawn at the conclusion of collecting survey data and only the five randomly chosen winners will be contacted to organise voucher delivery.
Contact email/phone number details will be stored separately from the survey responses, this information will not be used for any other purposes then the prize draw and contact details will be destroyed once all vouchers have been claimed.

- Yes
- No

Thank you for sharing your valuable knowledge that has been gained by your own travel experience. This information will provide insight into the traffic behaviours of drivers and cyclists when interacting with other road users and improve the understanding about how people feel when travelling. This information can be used to inform the development of road safety strategies and guide the development of a safer transport network. Thank you.

This study is only for people with a driving licence. Thank you again for your interest in the study.

Appendix B

Table B1 Complete and partial completion participant mean values of items

	Car drivers (n=162)	Cyclists (n=533)	Car drivers (n=151)	Cyclists (n=444)
Failing to Yield Interacting with a bike	3.043	2.396	3.039	2.714
Interacting with a car	3.080	3.824	3.099	3.912
Participant violates road rule	3.228	3.448	3.264	3.358
Going through a red light				
Interacting with a bike	3.356	2.692	3.37	2.714
Interacting with a car	3.697	3.881	3.708	3.921
Participant violates road rule	3.438	3.356	3.47	3.358
Not signalling when turning				
Interacting with a bike	2.833	2.566	2.847	2.574
Interacting with a car	2.981	3.409	3.019	3.425
Participant violates road rule	3.074	2.782	3.145	2.786
Swerving				
Interacting with a bike	3.426	2.653	3.443	2.653
Interacting with a car	3.541	3.46	3.562	3.461
Participant violates road rule	3.445	3.48	3.463	3.479
Tailgating				
Interacting with a bike	3.755	3.527	3.761	3.531
Interacting with a car	4.038	3.949	4.053	3.959
Participant violates road rule	3.561	3.401	3.562	3.407
Not checking traffic				
Interacting with a bike	3.664	3.107	3.682	3.114
Interacting with a car	3.754	3.661	3.781	3.659
Participant violates road rule	3.632	3.777	3.642	3.774

1 very unlikely - 5 very likely

Table B2 Age groups of complete survey participants by gender

Age groups of complete sample	Male (n=360)	Female (n=235)	Statistical Test
Mean age	45.81	44.75	t (593) = 1.054, p = .292
19 and under	1 (0.3%)		
20 -29	39 (10.8%)	29 (12.3%)	
30 -39	72 (20.0%)	56 (23.8%)	$\chi2(7) = 3.874$, p = .794
40 -49	94 (26.1%)	61 (26.0%)	
50 -59	113 (31.4%)	62 (26.4%)	
60 -69	33 (9.2%)	23 (9.8%)	
70 -79	7 (1.9%)	4 (1.7%)	

Survey participants provided their postcode to identify their place of residence. Almost two thirds of participants (65.6%) lived in Queensland. While almost all the drivers (95.4%) resided in Queensland, only half of the cyclists (55.4%) resided in Queensland. Among the cyclists not living in Queensland, most were from New South Wales, the Australian Capital Territory, and Victoria and from South Australia (Table B.3). More cyclists (71.4%) than drivers (62.3%) lived in capital cities. There was no significant difference between cyclists and drivers in the SEIFA deciles; approximately half of the participants resided in a location with a SEIFA of 9 or 10 which signifies a location of advantage (Table B.3).

Table B3 Residential characteristics of cyclist and driver participants in the study

State of residency	Cyclists (n=444)	Drivers (n=151)	Statistical tests
QLD	264 (55.5%)	144 (95.4%)	
NSW	53 (12.0%)	2 (1.3%)	
ACT	47 (10.6%)	0 (0%)	
WA	22 (5.0%)	1 (0.7%)	$\chi2(6) = 80.375$, $p < .001$
NT	0 (0%)	0 (0%)	
VIC	36 (8.1%)	3 (2.0%)	
TAS	4 (0.9%)	0 (0%)	
SA	35 (7.9%)	1 (0.7%)	
Population of town where you live			
10,000 or less	27 (6.1%)	4 (2.6%)	$\chi2(4) = 19.405$, $p =.001$
10,000 to 24,999	8 (1.8%)	12 (7.9%)	
25,000 to 99,999	25 (5.6%)	14 (9.3%)	
100,000 or more (not capital city)	67 (15.1%)	27 (17.9%)	
Capital City	317 (71.4%)	94 (62.3%)	
SEIFA Advantage and disadvantage deciles			
1	8 (1.8%)	0 (0.0%)	
2	5 (1.1%)	5 (3.3%)	
3	9 (2.0%)	8 (5.3%)	
4	18 (4.1%)	7 (4.6%)	
5	45 (10.1%)	6 (4.0%)	$\chi2(9) = 16.159$, $p =.064$
6	30 (6.8%)	13 (8.6%)	
7	37 (8.3%)	15 (9.9%)	
8	84 (18.9%)	28 (18.5%)	
9	105 (23.6%)	34 (22.5%)	
10	103 (23.3%)	35 (23.0%)	

Purpose of travel and distance travelled to work

Cyclists and drivers were asked about their frequency of travel for various purposes and their distance travelled to work. There was a significant association between participant type (cyclist or driver) and the frequency of use of that vehicle type for work or shopping ($\chi2$ (6) = 115.378, $p < .000$). Drivers used their cars more often than cyclists used their bicycles, with 57.6% of drivers and 14.6% of cyclists reporting driving or riding once a day for work or shopping (Table B.4). It should be noted that 70 (15.1%) cyclists who indicated they rode to work less than once a week would not have been classified as cyclists by Chaurand & Delhomme (2013).

The patterns of use of bicycles and cars also differed by purpose of travel. Drivers were more likely to report 'never' using their car to travel to work or study (χ^2 (3) = 13.531, *p* <.004), while cyclists were more likely to report 'never' using their bicycle for everyday shopping ($\chi 2(3) = 136.911$, $p < .000$) or to run errands ($\chi 2$ (3) = 85.302, $p < .000$) (Table B.4).

More drivers (8.6%) than cyclists (4.5%) worked from home or travelled a variable distance to work or study (9.3% drivers and 2.0% cyclists) ($\chi 2$ (7) = 26.765, $p < .000$). More than a third of cyclists (36.0%) and 29.1% of drivers lived less than 10 km from their place of work. An additional third of cyclists (33.6%) and 27.8% of drivers lived 10 to 19 km away from work. Among the participants directed into the driver survey, 85 (50%) of the driver participants never rode bicycles.

Table B4 Cyclist and driver travel characteristics

Cycling and Driving behaviour	Cyclists (n=444)	Drivers (n=151)	Statistical tests
Frequency of cycling or driving for work or shopping			
Never	24 (5.4%)	0 (0%)	
Less than once a month	24 (5.4%)	1 (0.7%)	
1 to 3 times a month	19 (4.3%)	2 (1.3%)	$\chi^2(6) = 115.378$, $p < .000$
Once a week	33 (7.4%)	6 (4.0%)	
2 or 3 times a week	100 (22.5%)	24 (15.9%)	
4 to 6 times a week	178 (40.3%)	31 (20.5%)	
At least once a day	65 (14.6%)	87 (57.6%)	
Travel to work or study			
Never	70 (15.8%)	38 (25.2%)	
Sometimes	61 (13.8%)	25 (16.6%)	$\chi 2(3) = 13.531$, $p < .004$
Often	84 (19.0%)	13 (8.6%)	
Very Often	228 (51.5%)	75 (49.7%)	
Everyday shopping			
Never	176 (39.5%)	6 (4.0%)	
Sometimes	180 (40.6%)	40 (26.5%)	
Often	41 (9.3%)	47 (31.3%)	$\chi 2(3) = 136.911$, $p < .000$
Very Often	47 (10.6%)	57 (38.0%)	

Leisure/recreation	Cyclists (n=444)	Drivers (n=151)	
Never	7 (1.6%)	1 (0.7%)	
Sometimes	102 (23.0%)	51 (33.8%)	$\chi 2(3) = 7.371$, $p < .061$
Often	145 (32.7%)	45 (29.8%)	
Very Often	190 (42.7%)	54 (35.8%)	
To run errands			
Never	117 (26.4%)	5 (3.3%)	
Sometimes	209 (47.2%)	47 (31.1%)	$\chi 2(3) = 85.044$, $p < .000$
Often	56 (12.6%)	40 (26.5%)	
Very Often	61 (13.8)	59 (39.1%)	
Distance travelled to work			
Not Available/ variable	9 (2.0%)	14 (9.3%)	
Work from home	20 (4.5%)	13 (8.6%)	
1 - 9 km	160 (36.0%)	44 (29.1%)	$\chi 2(7) = 26.765$, $p < .000$
10 - 19 km	149 (33.6%)	42 (27.8%)	
20 - 29 km	57 (12.8%)	18 (11.9%)	
30 - 39 km	27 (6.1%)	11 (7.3%)	
40 - 49 km	8 (1.8%)	7 (4.6%)	
50 km and over	14 (3.2%)	2 (1.3%)	

Cycling four or more times per week was recorded by 78.3% of male and 70.1% of female cyclists ($\chi2(3) = 4.822$ $p < .185$), with both male and female cyclists spending similar lengths of time cycling ($\chi2(5) = 6.220$ $p < .285$). There was a statistically significant difference between male and female participants in the distance ridden each week ($\chi2(4) = 14.432$ $p < .006$), where 57.6% of male cyclists rode over 100 km compared to 40.7% female cyclists. However, 32.1% of female cyclists and 22.0% of male cyclists rode between 50 and 100 km per week (see Table 5.10).

Male cyclists (58.5%) used their bicycle more frequently to ride to work or shopping than female cyclists (47.8%) ($\chi2(6) = 10.767$ $p < .096$). Three quarters of male cyclists (73.0%) and two thirds of female (65.0%) cyclists rode their bicycle often or very often to travel to work or study ($\chi2(3) =7.965$ $p < .047$). One quarter of female cyclists (22.9%) never used their bicycle to travel to work whereas 12.5% of males never used their bicycle to travel to work or study (see Table B.5).

Table B5 Male and female cyclist travel characteristics

How often do you ride a bicycle?	Female cyclist (n=140)	Male cyclist (n=304)	Statistical Test
2 or 3 times a week	39 (27.9%)	66 (21.7%)	
4 to 6 times a week	73 (52.1%)	158 (52.0%)	$\chi2(3) = 4.822$ $p = .185$
At least once a day	20 (14.3%)	68 (22.4%)	
Once a week	8 (5.7%)	12 (3.9%)	
On average how far do you ride each week?			
Less than 5 km	2 (1.4%)	2 (0.7%)	
Between 5 km and less than 20 km	17 (12.1%)	18 (5.9%)	
Between 20 km and less than 50 km	19 (13.6%)	42 (13.8%)	
Between 50 km and less than 100 km	45 (32.1%)	67 (22.0%)	$\chi2(4) = 14.432$ $p = .006$
100 km and more	57 (40.7%)	175 (57.6%)	
How often do you use a bicycle to travel around town, for example to travel to work, do your shopping etc.?			
Never	11 (7.9%)	13 (4.3%)	
Less than once a month	12 (8.6%)	12 (3.9%)	
1 to 3 times a month	9 (6.4%)	10 (3.3%)	
Once a week	9 (6.4%)	24 (7.9%)	$\chi2(6) = 10.767$ $p = .096$
2 or 3 times a week	32 (22.9%)	68 (22.4%)	
4 to 6 times a week	51 (36.4%)	128 (42.1%)	
At least once a day	16 (11.4%)	49 (16.1%)	
On average how much time do you spend riding each week?			
Less than 30 minutes	0 (0%)	2 (0.7%)	
Between 30 minutes and less than 2 hours	15 (10.7%)	16 (5.3%)	
Between 2 hours and less than 5 hours	42 (30.0%)	89 (29.3%)	$\chi2 (5) = 6.220$ $p = .285$
Between 5 hours and less than 10 hours	57 (40.7%)	129 (42.4%)	
Between 10 hours and less than 15 hours	22 (15.7%)	53 (17.4%)	
15 hours and more	4 (2.9%)	15(4.9%)	
Do you own a bicycle?			
Yes	140(100.0%)	303 (99.7%)	$\chi2(1) = .462$ $p = .479$

Both male and female cyclists do not regularly use their bicycle to run errands or do everyday shopping. Bicycles were never used by 39.8% of male and 39.3% of female cyclist participants for everyday shopping and 32.9% of female and 23.4% male cyclist participants to run errands. Almost all cyclists rode their bicycle often or very often for recreation with only 2.1% of female and 1.3% of male cyclists reporting they never rode for leisure and recreation.

Table B6 Male and female cyclist frequency of cycling for different purposes

How often do you ride a bicycle?	Female cyclist (n=140)	Male cyclist (n=304)	
How often do you use your bicycle for:			
Travel to work or study			
Never	32 (22.9%)	38 (12.5%)	
Sometimes	17 (12.1%)	44 (14.5%)	
Often	26 (18.6%)	58 (19.1%)	$\chi2(3)$ =7.965 p = .047
Very Often	65 (46.4%)	164 (53.9%)	
Everyday shopping			
Never	55 (39.3%)	121 (39.8%)	
Sometimes	57 (40.7%)	123 (40.5%)	
Often	13 (9.3%)	28 (9.2%)	$\chi2(3)$ =.012 p = 1.000
Very Often	15 (10.7%)	32 (10.5%)	
Leisure/recreation			
Never	3 (2.1%)	4 (1.3%)	
Sometimes	28 (20.0%)	74 (24.3%)	
Often	42 (30.0%)	103 (33.9%)	$\chi2(3)$ =2.870 p = .412
Very Often	67 (47.9%)	123 (40.5%)	
To run errands			
Never	46 (32.9%)	71 (23.4%)	
Sometimes	55 (39.3%)	155 (51.0%)	$\chi2(3)$ =6.253 p = .100
Often	19 (13.6%)	37 (12.2%)	
Very Often	20 (14.3%)	41 (13.5%)	

Both male drivers (59.0%) and female drivers (57.9%) drove their car often or very often to travel to work or study ($\chi2$ (3) =4.499 p < .212). Overall, more female drivers used their car for travel to work or study with 28.6% of male driver participants and 23.2% of female driver participants reporting they never drove their car to travel to work (see Table B.7).

Table B7 Male and female driver travel characteristics

Male and female driver characteristics	Female driver (n=95)	Male driver (n=56)	
How often do you ride a bicycle?			
Never	52 (54.7%)	27 (48.2%)	
1 to 3 times a month	10 (10.5%)	10 (17.9%)	$\chi2(2) = 1.723$ p =.423
Less than once a month	33 (34.7%)	19 (33.9%)	
On average how far do you drive each week?			
Less than 10 km	8 (8.4%)	0 (0%)	
Between 10 km and less than 50 km	30 (31.6%)	11 (19.6%)	
Between 50 km and less than 100 km	20 (21.1%)	10 (17.9%)	
Between 100 km and less than 200 km	18 (18.9%)	13 (23.2%)	$\chi2(5) = 8.754$ p = .119
Between 200 km and less than 300 km	11 (11.6%)	10 (17.9%)	
Between 300 km and less than 400 km	7 (7.4%)	7 (12.5%)	
400 km and more	1 (1.1%)	5 (8.9%)	
How often do you drive a car?			
Less than once a month	1 (1.1%)	0 (0%)	
1 to 3 times a month	2 (2.1%)	0 (0%)	$\chi2(6) = 14.557$ p = .024
Once a week	3 (3.2%)	3 (5.4%)	
2 or 3 times a week	16 (16.8%)	8 (14.3%)	
4 to 6 times a week	25 (26.3%)	6 (10.7%)	
At least once a day	48 (50.5%)	39(69.6%)	
Male and female driver	**Female driver (n=95)**	**Male driver (n=56)**	
On average how much time do you spend driving a car each week?			
Less than 30 minutes	6 (6.3%)	0 (0%)	
Between 30 minutes and less than 2 hours	25 (26.3%)	14 (25.0%)	$\chi2$ (5) =12.713 p = .026
Between 2 hours and less than 5 hours	31 (32.6%)	14 (25.0%)	
Between 5 hours and less than 10 hours	20 (21.1%)	11 (19.6%)	
Between 10 hours and less than 15 hours	11 (11.6%)	9 (16.1%)	

More female drivers (79.7% and 74.7%) drove their cars often or very often for everyday shopping ($\chi2$ (3) =15.434 p < .001) and running errands ($\chi2$(3) =10.515 p < .015) than male drivers (51.5% and 50.0%). All male drivers and 98.9% of female drivers reported they used their car for recreation ($\chi2$ (3) =2.126 p < .547)(see Table B.8).

Table B8 Male and female driver frequency of driving for different purposes

Do you own a car?	Female driver (n=95)	Male driver (n=56)	
Yes	91(95.8%)	54 (96.4%)	
No	4 (4.2%)	2 (3.6%)	
How often do you use your car for:			
Travel to work or study			
Never	22 (23.2%)	16 (28.6%)	
Sometimes	18 (18.9%)	7 (12.5%)	
Often	11 (11.6%)	2 (3.6%)	$\chi2(3)$ =4.499 p = .212
Very Often	44 (46.3%)	31 (55.4%)	
Everyday shopping			
Never	4 (4.3%)	2 (3.6%)	
Sometimes	15 (16.0%)	25 (44.6%)	
Often	32 (34.0%)	15 (26.8%)	$\chi2(3)$ =15.434 p = .001
Very Often	43 (45.7%)	14 (25.0%)	
Leisure/recreation			
Never	1 (1.1%)	0 (0%)	
Sometimes	29 (30.5%)	22 (39.3%)	
Often	28 (29.5%)	17 (30.4%)	$\chi2(3)$ =2.126 p = .547
Very Often	37 (38.9%)	17 (30.4%)	
To run errands			
Never	3 (3.2%)	2 (3.6%)	
Sometimes	21 (22.1%)	26 (46.4%)	$\chi2(3)$ =10.515 p = .015
Often	27 (28.4%)	13 (23.2%)	
Very Often	44 (46.3%)	15 (26.8%)	

Participants were asked if they had been involved in one or more accidents in the last three years (as a cyclist for cyclists and as a car driver for car drivers). The question specified that an accident could be minor damages, a property damage-only accident, or a serious accident. The term accident rather than crash was used to encourage the participant to include a broader spectrum of incidents, for example, those that had not resulted in serious injury. Cyclists were more likely than drivers to report being involved in an accident in the past three years (47.3% versus 21.2%, $\chi2(1) = 29.623$, $p < .001$).

Participants who identified they had been involved in one or more accidents were asked to describe the year and cause. Keywords appearing in self-reported crash descriptions were used to code crashes into crash types, including: Bicycle and car, Single vehicle; Two vehicle – other vehicle failed to give way; Two vehicle (same as participant's vehicle); Group of bicycles; avoiding another road user. There was a statistically significant association between the type of crash and contributing circumstances reported by cyclists and drivers ($\chi2(18) = 72.263$, $p < .001$). Approximately two thirds of the reported cyclist crashes (62.4%) were single vehicle crashes (see Table B9). The main contributing circumstances of single bicycle crashes were described as rider error or equipment malfunction (18.0%), poor road conditions or debris on the road (18.9%) and avoiding a crash with another road user (17.3%). The cyclist crashed with another road user in 37.3% of the reported crashes. The crash characteristics described by the cyclist identified that one quarter 24.3% had crashed with a car, 1.0% with a truck or bus, 9.3% with other cyclists and 0.5% with a pedestrian (Table B.9). The crash characteristics described by drivers identified that a crash with another car user was recorded for 50.0% of driver crashes, a truck or bus for 3.7% and a dooring of a motorcycle 3.7%. One third (33.3%) of driver crashes were single vehicle with 18.5% occurring in off-road parking areas and 11.1% provided an insufficient description of the crash for it to be categorised. No driver participant reported they had been involved in a crash with a cyclist (Table B9).

Table B9 Self-reported cyclist and driver crash descriptions

Crash description	Cyclist (n=210)	Cyclist 2nd accident (n=46)	Driver (n= 32)	Driver 2nd crash (n=6)
Crash involving other road user				
Bicycle and car	51(24.3%)	11(23.9%)		
Vehicle with truck or bus	2 (1.0%)	2 (2.2%)	1 (3.7%)	
2 vehicle (same as participant)	13 (6.2%)	3 (6.5%)	16 (50.0%)	2 (33.3%)
Dooring	4 (1.9%)		1 (3.7%)	
Group of bicycles	5 (2.4%)	2 (4.3%)		
Bicycle with pedestrian	1 (0.5%)			
Bicycle at intersection	2 (1.0%)	2.2%)		
Crash not involving other road user				
Single vehicle	37(17.6%)	8 (17%)	4 (12.5%)	1 (16.7%)
Single vehicle off road	13 (6.2%)	3 (6.5%)	5 (15.6%)	2 (33.3%)
Poor road conditions/debris on road	39 (18.9%)	11 (23.9%)	2 (6.3%)	1 (16.7%)
Vehicle avoiding truck or bus	1 (0.5%)			
Avoiding car	4 (1.9%)			
Avoiding bicycle	4 (1.9%)			
Avoiding pedestrian	4 (1.9%)	1 (2.2%)		
Dog, magpie, kangaroo	4 (1.9%)	1 (2.2%)		
NA information	4 (1.9%)		3 (11.1%)	

Male and female cyclists did not differ significantly in their likelihood of having been involved in one or more crashes in the past three years (50.0% versus 41.4%, $\chi 2(1) = 2.825$ $p = .093$) or in the type of crash they had been involved in (see Table B10). It could be argued that perceptions of risks and actual risks vary, so changing risk perceptions might not change injury rates.

Table B10 Cyclist participants' self-reported crash descriptions

As a cyclist how many accidents have you been involved in the last three years (an accident could be minor damages, a property damage-only accident, or a serious accident)?	Female (n=235)	Male (n=360)	Statistical Test
None	82 (58.6%)	152 (50.0%)	χ2(1) =2.825 p = .093
One or more	58 (41.4%)	152 (50.0%)	
First self-reported crash (n=210)	(n=58)	(n=152)	
Bicycle with car	12 (20.7%)	39 (25.7%)	
Bicycle with truck	1 (1.7%)	1 (0.7%)	
2 bicycle	5 (8.6%)	8 (5.3%)	
Dooring	1 (1.7%)	3 (2%)	
Group bicycle	2 (3.4%)	3 (2.0%)	
Bicycle with pedestrian	0 (0%)	1 (0.7%)	χ2(13) =20.192 p = .091
Bicycles at intersection	2 (3.4%)	0 (0%)	
Single bicycle	16 (27.6%)	21 (13.8%)	
Single bicycle off road	2 (3.4%)	11 (7.2%)	
Debris on road or poor road conditions	8 (13.8%)	31 (20.4%)	
Avoiding truck or bus	1 (1.7%)	0 (0%)	
Avoiding car	2 (3.4%)	2 (1.3%)	
Avoiding bicycle	4 (6.9%)	1 (0.7%)	
Avoiding pedestrian	1 (1.7%)	3 (2.0%)	
Dog	0 (0%)	4 (2.6%)	
No info just date	0 (0%)	4 (2.6%)	
Second self-reported crash (n=46)	(n=10)	(n=36)	
Bicycle with car	2 (20.0%)	10 (27.8%)	
Bicycle with truck	0 (0%)	2 (5.6%)	
2 bicycle	0 (0%)	3 (8.3%)	χ2(12) =12.359 p =.417
Group bicycle	1 (10.0%)	1 (2.8%)	
Bicycle at intersection	0 (0%)	1 (2.8%)	
Single bicycle	3 (30.0%	5 (13.9%)	
Single bicycle off road	0 (0%)	3 (8.3%)	
Debris on road or poor road conditions	3 (30.0%)	8 (22.2%)	
Bicycle avoiding car	1 (10.0%)	1 (2.8%)	
Avoiding pedestrian	0 (0%)	1 (2.8%)	
Dog	0 (0%)	1 (2.8%)	

There was no significant difference in their likelihood of having been involved in one or more crashes in the past three years (24.2% versus 16.1%, $\chi2(1) =1.397$ $p = .237$) or in the type of crash they had been involved in (see Table B11).

Table B11 Car driver self-reported crash descriptions

As a car driver, how many accidents have you been involved in the last three years (an accident could be minor damages, a property damage-only accident, or a serious accident)?			
	Female driver (n=95)	Male driver (n=56)	Statistical test
None	72 (75.8%)	47 (83.9%)	$\chi2(1) =1.397$ $p= .237$
Once or more	23 (24.2%)	9 (16.1%)	
Self-reported crash	(n=23)	(n=9)	
Car with bicycle	0 (0%)	0 (0%)	
Vehicle with truck or bus	0 (0%)	1 (11.1%)	
2 vehicle	13 (56.5%)	3 (33.3%)	$\chi2(6) =6.503$ $p = .369$
Dooring	1 (4.3%)	0 (0%)	
Single vehicle	3 (13%)	1 (11.1%)	
Single vehicle off road	4 (17.4%)	1 (11.1%)	
Poor road conditions/ debris on road	1 (4.3%)	1 (11.1%)	
NAinfo	1 (4.3%)	2 (22.2%)	

Levels of perceived risk

The overall mean ratings of perceived risk for each of the six Situations and two Configurations (interact with a bike and a car, excluding when the participant is responsible) are summarised in Table B.12. Cyclists recorded a lower level of perceived risk than drivers; males recorded a lower level of perceived risk than females; and higher level of perceived risk was recorded when the interacting vehicle was a car. Tailgating was the Situation with the highest level of risk perceived by all participants and Failing to yield was the Situation identified as least risky.

Table B12 Mean ratings of perceived risk

Variable Situation	Mean	SD
Failing to yield	3.11	0.93
Going through a red light	3.37	1.02
Not signalling	2.98	0.91
Swerving	3.17	1.00
Tailgating	3.79	0.92
Not checking traffic	3.47	1.14
Participant type		
Cyclist	3.31	0.82
Driver	3.42	0.76
Gender		
Female	3.56	0.67
Male	3.18	0.85
Other vehicle		
Car	3.55	0.87
Bicycle	2.97	0.86

Cyclist s' and drivers' levels of perceived risk for each of the six Situations and two Configurations (interact with a bike, interact with a car) are presented in Table B13. Both cyclists (m=3.75) and drivers (m= 3.91) perceived tailgating as the Situation with the highest level of risk ($\chi2$ (8) =14.12, p = .077) and the least risk for not signalling when turning ($\chi2$ (8) =10.60, p = .226): drivers (m=2.93) and cyclists (m=3.00). There was a significant statistical association between the cyclists' and drivers' perceived risk for the remaining four Situations: failing to yield ($\chi2$ (8) =40.64, p < .001), going through a red light ($\chi2$ (8) =25.45, p = .001), swerving ($\chi2$ (8) =56.35, p < .001) and not checking traffic ($\chi2$ (8) =45.83, p < .001) (Table B13).

Table B13 Cyclist and driver mean levels and standard deviation of risk ratings by Situations

Situation	Cyclist		Driver		Total		
	Mean	SD	Mean	SD	Mean	SD	
Failing to yield	3.12	0.89	3.07	1.04	3.11	0.93	$\chi2(8) =40.64, p < .001$
Going through red light	3.31	1.02	3.53	1.00	3.37	1.02	$\chi2(8) =25.45, p = .001$
Not signalling when turning	3.00	0.90	2.93	0.96	2.98	0.91	$\chi2(8) =10.60, p = .226$
Swerving	3.06	0.97	3.50	1.03	3.17	1.00	$\chi2(8) =56.35, p < .001$
Tailgating	3.75	0.93	3.91	0.89	3.79	0.92	$\chi2(8) =14.12, p .077$
Not checking traffic	3.39	1.14	3.73	1.11	3.48	1.14	$\chi2(8) =45.83, p < .001$

Table B14 Cyclist and driver mean levels of risk ratings by Age and Situation

	N	Failing to Yield	Going through a red light	Not signall-ing	Swerv-ing	Tailgat-ing	Not check-ing traffic
>19 male cyclist	1	2.00	2.50	2.00	3.50	3.50	3.50
20-30 male cyclist	32	3.38	3.55	3.05	3.13	4.09	3.47
20-30 male driver	7	2.79	3.36	2.36	3.14	3.86	3.86
20-30 female cyclist	14	3.75	3.43	3.07	3.00	4.00	3.71
20-30 female driver	15	3.20	3.93	3.43	3.63	4.10	3.93
30-40 male cyclist	67	3.07	3.16	2.80	2.87	3.57	3.16
30-40 male driver	5	2.40	3.20	2.70	3.30	3.90	3.10
30-40 female cyclist	36	3.21	3.72	3.24	3.24	4.10	3.82
30-40 female driver	20	3.10	3.48	2.88	3.48	3.98	3.88
40-50 male cyclist	87	2.92	3.01	2.81	2.88	3.52	3.23
40-50 male driver	8	3.50	3.56	2.56	3.63	4.13	3.56
40-50 female cyclist	41	3.21	3.82	3.28	3.30	4.10	3.76
40-50 female driver	20	3.08	3.73	3.10	3.68	3.95	4.05
50-60 male cyclist	93	3.09	3.25	3.00	3.09	3.66	3.27
50-60 male driver	20	3.20	3.50	2.85	3.53	3.75	3.53
50-60 female cyclist	34	3.19	3.62	3.04	3.10	3.71	3.49
50-60 female driver	27	3.17	3.72	3.30	3.56	3.91	4.04
60-70 male cyclist	23	2.96	2.85	3.09	3.11	3.61	3.09
60-70 male driver	11	2.73	2.95	2.45	3.09	3.55	3.50
60-70 female cyclist	13	3.46	3.62	3.54	3.62	4.31	4.08
60-70 female driver	10	3.20	3.95	2.70	3.80	4.05	3.55
70 < male cyclist	2	2.00	2.00	2.00	1.50	1.75	2.00
70 < male driver	5	2.70	2.80	2.40	3.20	3.70	2.90
70< female cyclist	1	2.00	1.00	3.00	3.00	2.50	2.00
70 < female driver	3	2.50	2.33	3.17	3.17	4.00	2.33

Table B15 Total participants' overall mean risk levels by frequency of monthly use

Monthly use	Mean	N	SD
Never	3.61	24	0.65093
Less than once a month	3.34	25	0.72246
1 to 3 times a month	3.08	21	0.65853
Once a week	3.25	39	0.71851
2 or 3 times a week	3.40	123	0.73252
4 to 6 times a week	3.33	210	0.73532
A least once a day	3.23	153	0.82042
Total	3.32	595	0.753

Table B16 Total participants' overall mean risk levels by Situation and frequency of monthly use

Monthly use		Failing to yield	Going through a red light	Not signallin g when turning	Swerv-ing	Tail-gating	Not checkin g traffic
Never	Mean	3.52	3.71	3.38	3.27	3.88	3.92
	SD	1.04	0.87	0.89	0.74	0.76	0.88
Less than once a month	Mean	3.12	3.28	3.06	3.08	3.82	3.68
	SD	0.81	1.15	0.67	1.08	0.73	1.01
1 to 3 times a month	Mean	2.79	2.90	3.02	3.10	3.60	3.07
	SD	0.86	1.02	0.72	1.00	1.00	1.06
Once a week	Mean	3.15	3.27	2.95	3.12	3.53	3.47
	SD	0.83	0.96	0.89	1.04	0.92	1.27
2 or 3 times a week	Mean	3.23	3.44	3.17	3.17	3.89	3.51
	SD	0.86	1.02	0.93	0.93	0.92	1.07
4 to 6 times a week	Mean	3.11	3.37	2.95	3.17	3.85	3.50
	SD	0.89	1.00	0.87	1.03	0.87	1.12
A least once a day	Mean	2.96	3.37	2.80	3.20	3.69	3.36
	SD	1.03	1.04	0.99	1.04	1.01	1.23
Total	Mean	3.11	3.37	2.98	3.17	3.79	3.47
	SD	0.93	1.01	0.91	1.00	0.92	1.14

Drivers were more likely to report having received traffic fines when driving within the past three years than cyclists when riding (32.5% versus 2.5%, $\chi2(1) = 111.642$, $p < .000$). There was no significant effect of gender and the number of traffic violation fines for cyclists ($\chi2$ (1) =0.101, $p = .502$) and drivers ($\chi2$ (1) =0.089, $p = .451$).

Helmets were reported as always worn by 90.3% of cyclist participants and most of the time by 7.7% of cyclist participants. Seatbelts were reported as always worn by 95.4% of driver participants and most of the time by 3.3% of driver participants.

Table B17 As a car driver, how many times in the last three years have you been fined for breaking the road rules?

	Female	Male	Total
One or more fines	30	19	49
Percentage in gender	31.60%	33.90%	32.50%
None	65	37	102
Percentage in gender	68.40%	66.10%	67.50%

Table B18 As a cyclist, how many times in the last three years have you been fined for breaking the road rules?

	Female	Male	Total
One or more fines	3	8	11
Percentage in gender	2.10%	2.60%	2.50%
None	137	296	433
Percentage in gender	97.90%	97.40%	97.50%

Table B19 Australian and French Mean rating by interacting vehicle and Situation

	French drivers (n=73)	Australian drivers (n=151)	French cyclists (n=309)	Australian cyclists (n=444)
Failure to yield				
Bike that violates road rules	2.58	3.04	1.54	2.38
SD	0.14	1.13	0.05	1.12
Car that violates road rules	3.01	3.00	3.12	3.85
SD	0.14	1.12	0.07	1.01
Violating road rules while interacting with different vehicle	2.76	3.26	3.06	3.46
SD	0.16	1.22	0.08	1.41
Going through a red light				
Bike that violates road rules	3.27	3.37	2.00	2.71
SD	0.14	1.12	0.06	1.19
Car that violates road rules	3.61	3.71	3.76	3.92
SD	0.14	1.08	0.07	1.17
Violating road rules while interacting with different vehicle	2.88	3.47	3.12	3.36
SD	0.18	1.40	0.09	1.60
Not signalling when turning				
Bike that violates road rules	2.37	2.85	1.85	2.57
SD	0.14	1.11	0.05	1.03
Car that violates road rules	2.83	3.02	3.16	3.43
SD	0.13	1.05	0.07	1.06
Violating road rules while interacting with different vehicle	2.76	3.15	2.49	2.79
SD	0.14	1.24	0.07	1.18
Swerving				
Bike that violates road rules	2.80	3.45	2.10	2.65
SD	0.15	1.14	0.06	1.19
Car that violates road rules	3.35	3.56	3.49	3.47
SD	0.13	1.06	0.07	1.13
Violating road rules while interacting with different vehicle	3.03	3.46	3.21	3.48
SD	0.16	1.18	0.08	1.38
Tailgating				
Bike that violates road rules	3.36	3.76	2.60	3.53
SD	0.15	1.01	0.07	1.00
Car that violates road rules	3.85	4.05	3.63	3.96
SD	0.13	0.89	0.07	1.06
Violating road rules while interacting with different vehicle	3.16	3.56	3.26	3.41
SD	0.17	1.19	0.07	1.28
Not checking traffic				
Bike that violates road rules	2.71	3.68	1.93	3.11
SD	0.14	1.17	0.06	1.14
Car that violates road rules	2.86	3.78	2.73	3.67
SD	0.13	1.12	0.07	1.28
Violating road rules while interacting with different vehicle	2.86	3.64	3.10	3.77
SD	0.14	1.16	0.08	1.27

Table B20 Driver and cyclist between subject effects frequency of violation

Situation Failing to give way	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	845.193	1	845.193	2365.013	.000	.800
Driver Cyclist	0.952	1	0.952	2.663	.103	.004
Gender	0.531	1	0.531	1.485	.224	.003
Driver Cyclist x Gender	0.002	1	0.002	0.005	.946	.000
Error	211.208	591	0.357			
a R Squared = .006 (Adjusted R Squared = .001)						
Going through a red light						
Intercept	804.099	1	804.099	1577.79	.000	.727
Driver Cyclist	3.389	1	3.389	6.65	.010	.011
Gender	0.002	1	0.002	0.004	.950	.000
Driver Cyclist x Gender	0.135	1	0.135	0.265	.607	.000
Error	301.195	591	0.51			
a R Squared = .013 (Adjusted R Squared = .008)						
Not signalling when turning						
Intercept	1712.447	1	1712.447	1982.935	.000	.707
Driver Cyclist	68.038	1	68.038	78.784	.000	.118
Gender	0.5	1	0.5	0.58	.447	.001
Driver Cyclist x Gender	0.236	1	0.236	0.274	.601	.000
Error	510.383	591	0.864			
a R Squared = .136 (Adjusted R Squared = .132)						
Swerving						
Intercept	882.713	1	882.713	2455.177	.000	.806
Driver Cyclist	1.58	1	1.58	4.395	.036	.007
Gender	0.042	1	0.042	0.118	.732	.000
Driver Cyclist x Gender	0.449	1	0.449	1.249	.264	.002
Error	212.483	591	0.36			
a R Squared = .011 (Adjusted R Squared = .006)						
Tailgating						
Intercept	1392.941	1	1392.941	2603.802	.000	.815
Driver Cyclist	7.737	1	7.737	14.463	.000	.024
Gender	2.349	1	2.349	4.391	.037	.007
Driver Cyclist x Gender	1.942	1	1.942	3.629	.057	.006
Error	316.164	591	0.535			
a R Squared = .041 (Adjusted R Squared = .036)						
Not checking traffic						
Intercept	962.593	1	962.593	2069.526	.000	.778
Driver Cyclist	15.549	1	15.549	33.429	.000	.054
Gender	0.486	1	0.486	1.046	.307	.002
Driver Cyclist x Gender	0.019	1	0.019	0.04	.842	.000
Error	274.89	591	0.465			
a R Squared = .055 (Adjusted R Squared = .050)						

Histograms of questions when the participant violates a road rule - drivers.

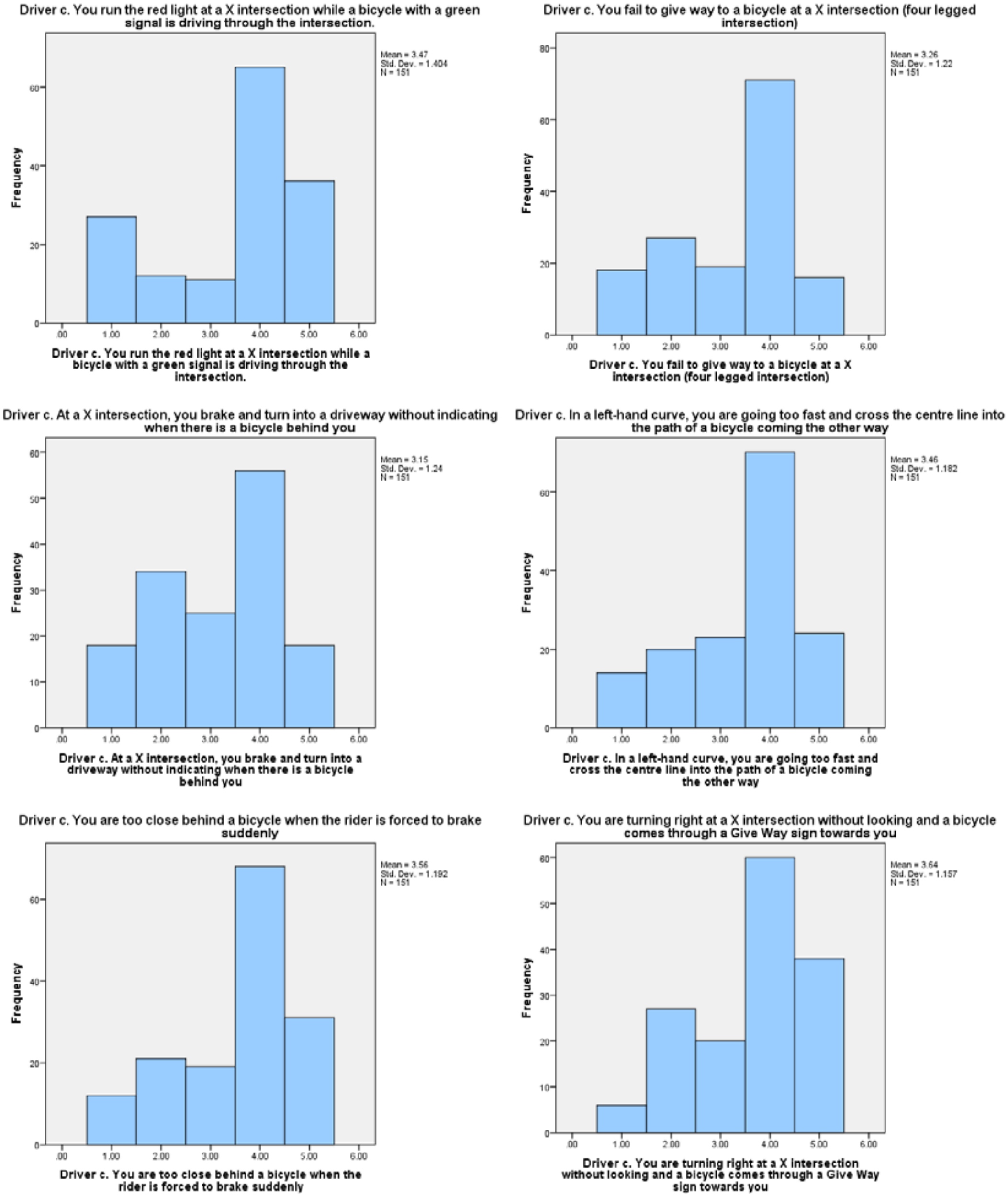


Figure B1 Risk ratings when driver participants are violating a road rule

Cyclist histograms of questions when the participant breaks the road rule

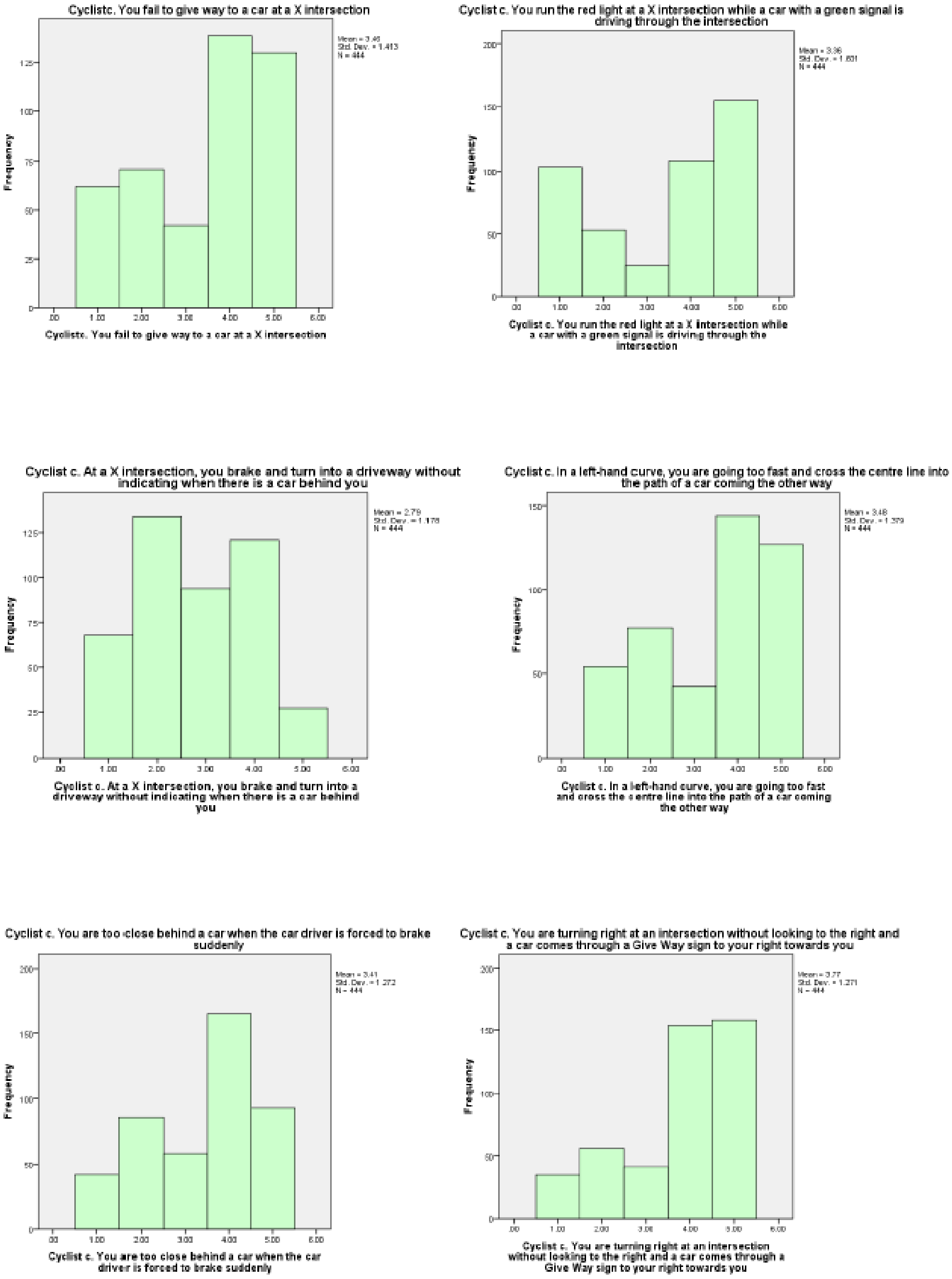


Figure B2 Risk ratings when cyclist participants are violating a road rule

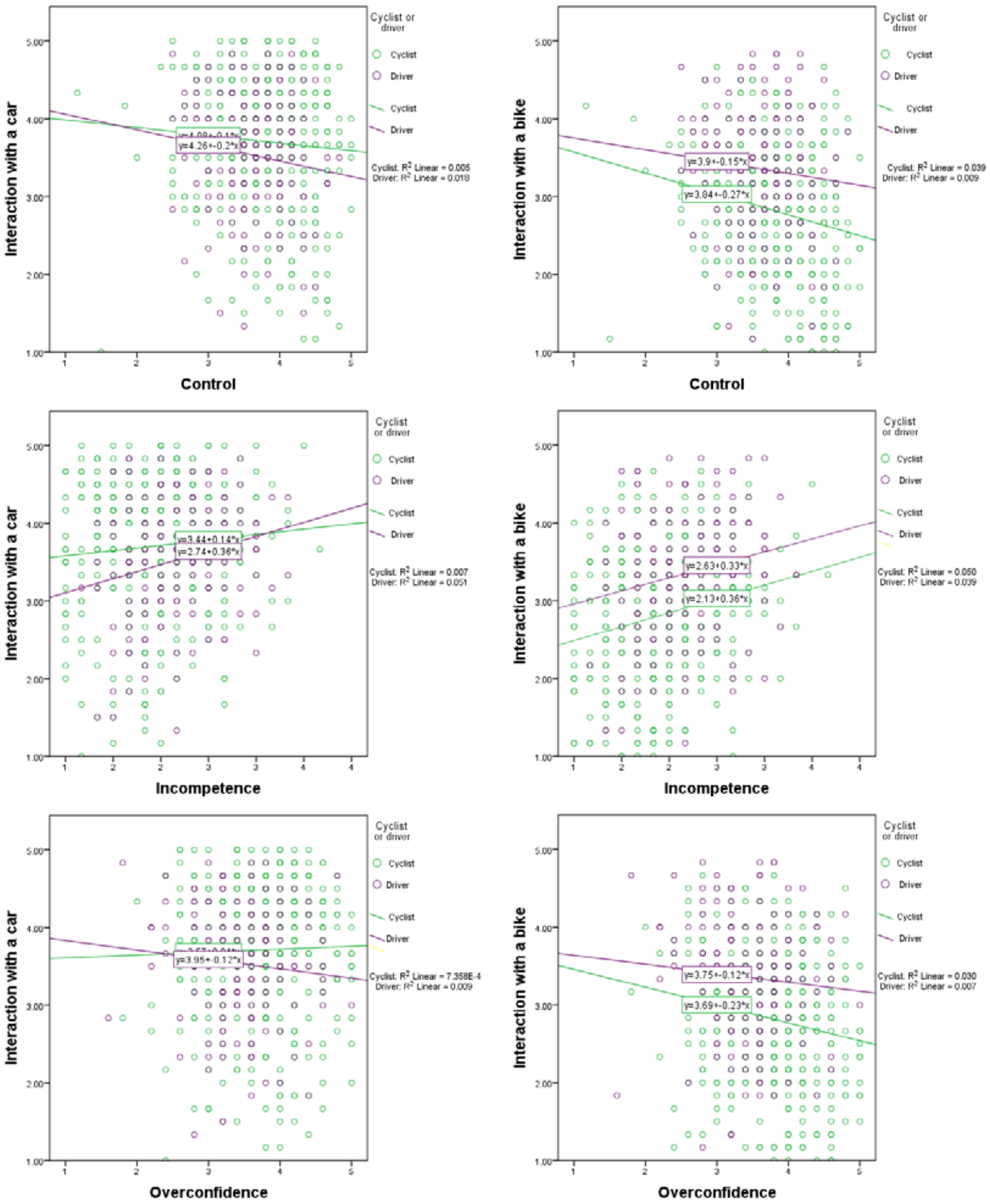
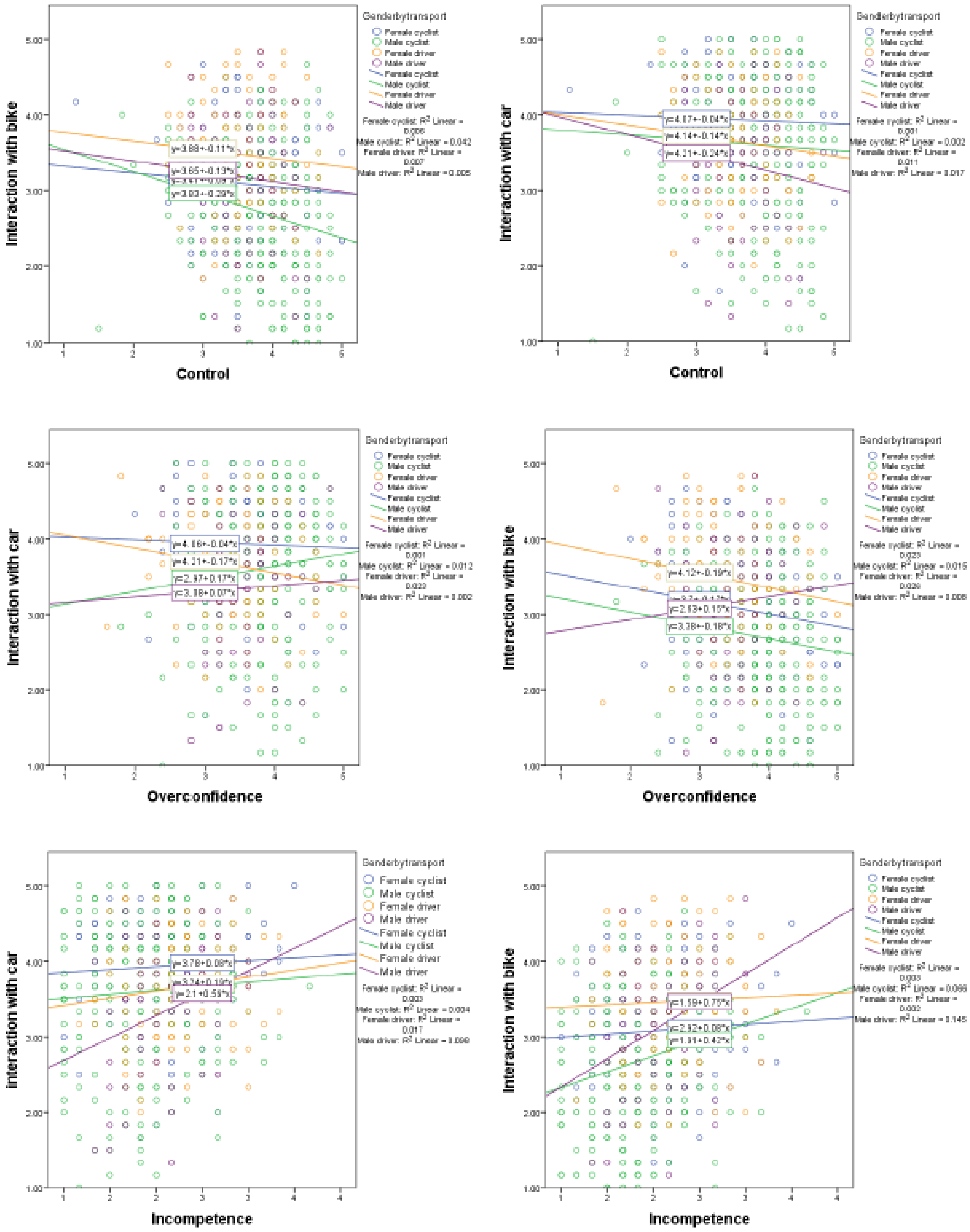
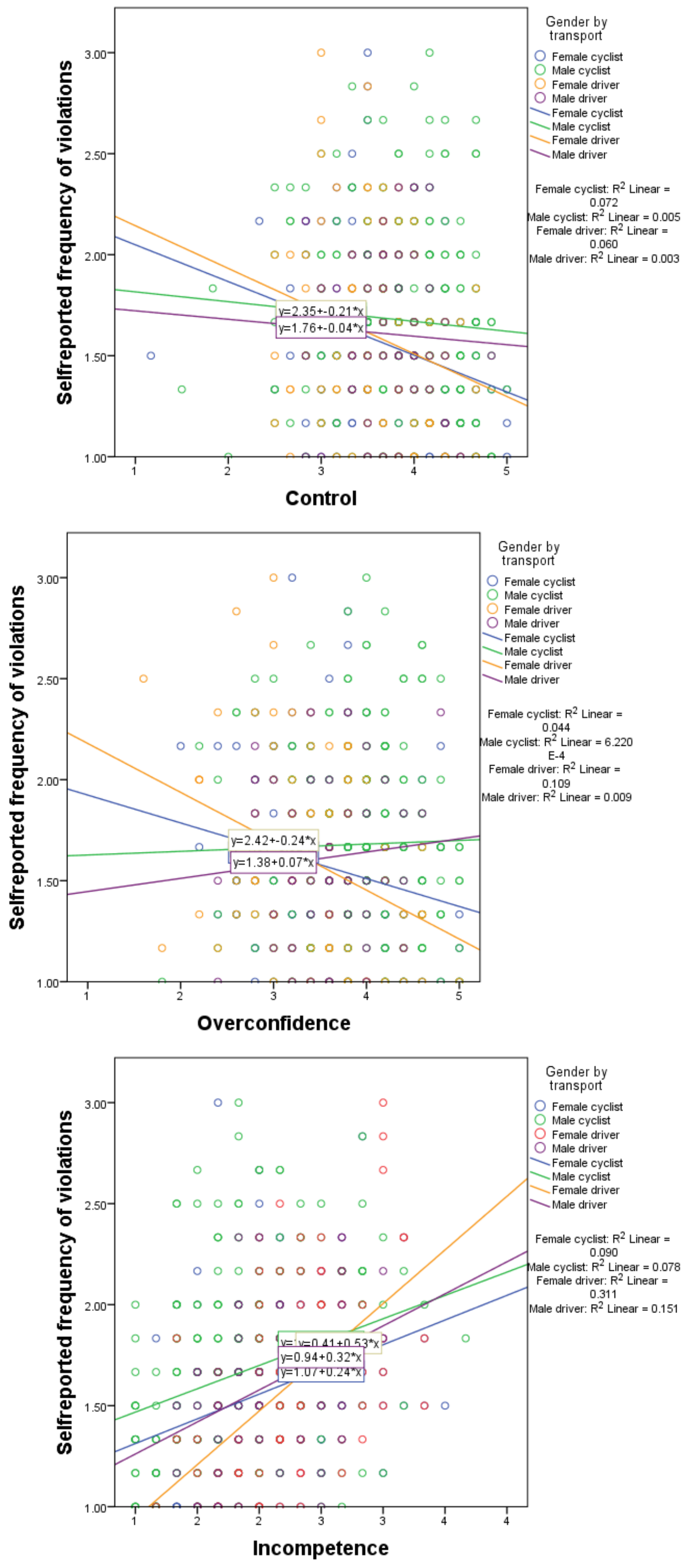


Figure B3 Scatter plots of perceived skill and risk rating by vehicle



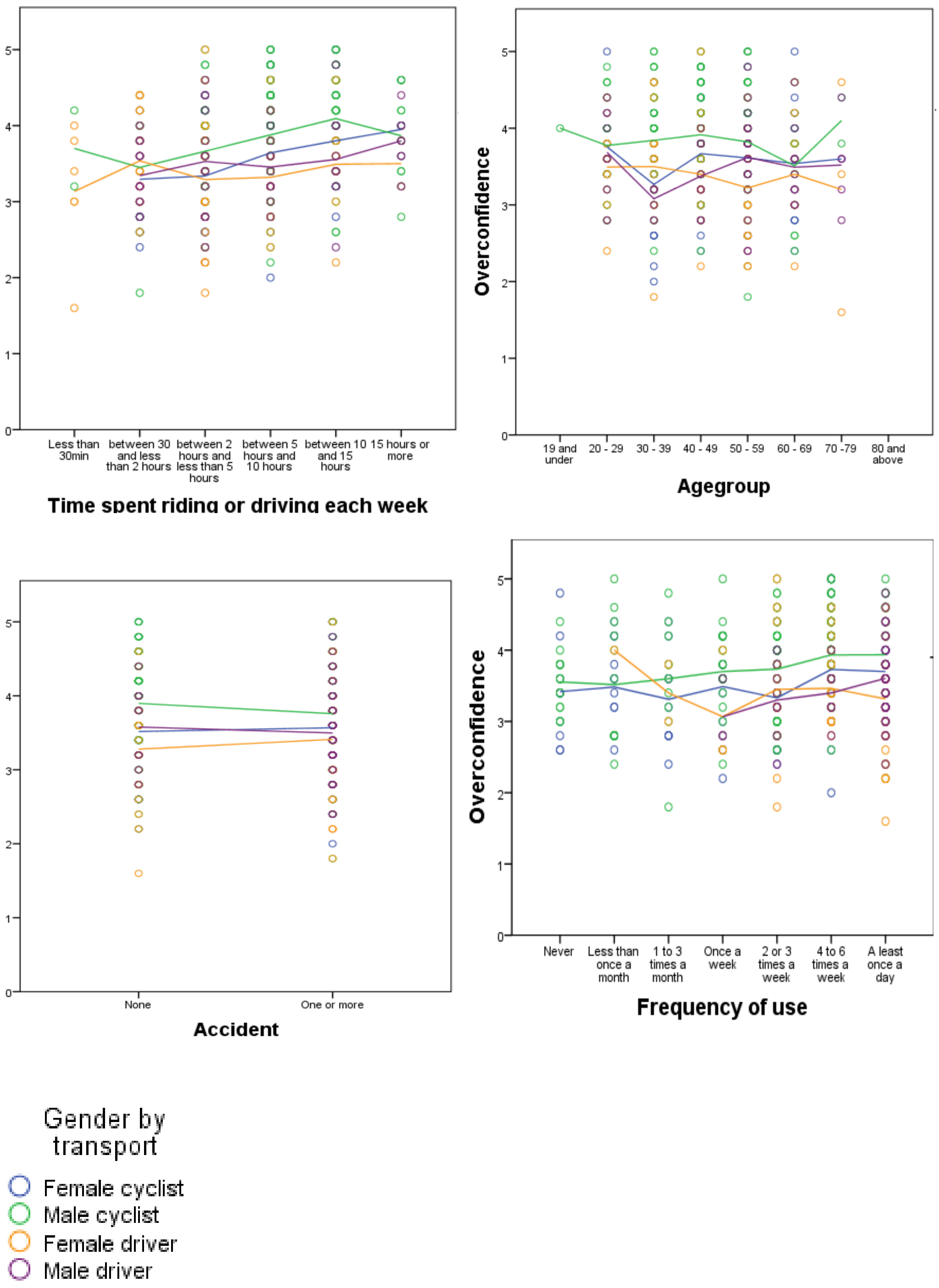
1= low to 5 =high

Figure B4 Scatter plots of male and female ratings of perceived skill and risk rating by vehicle



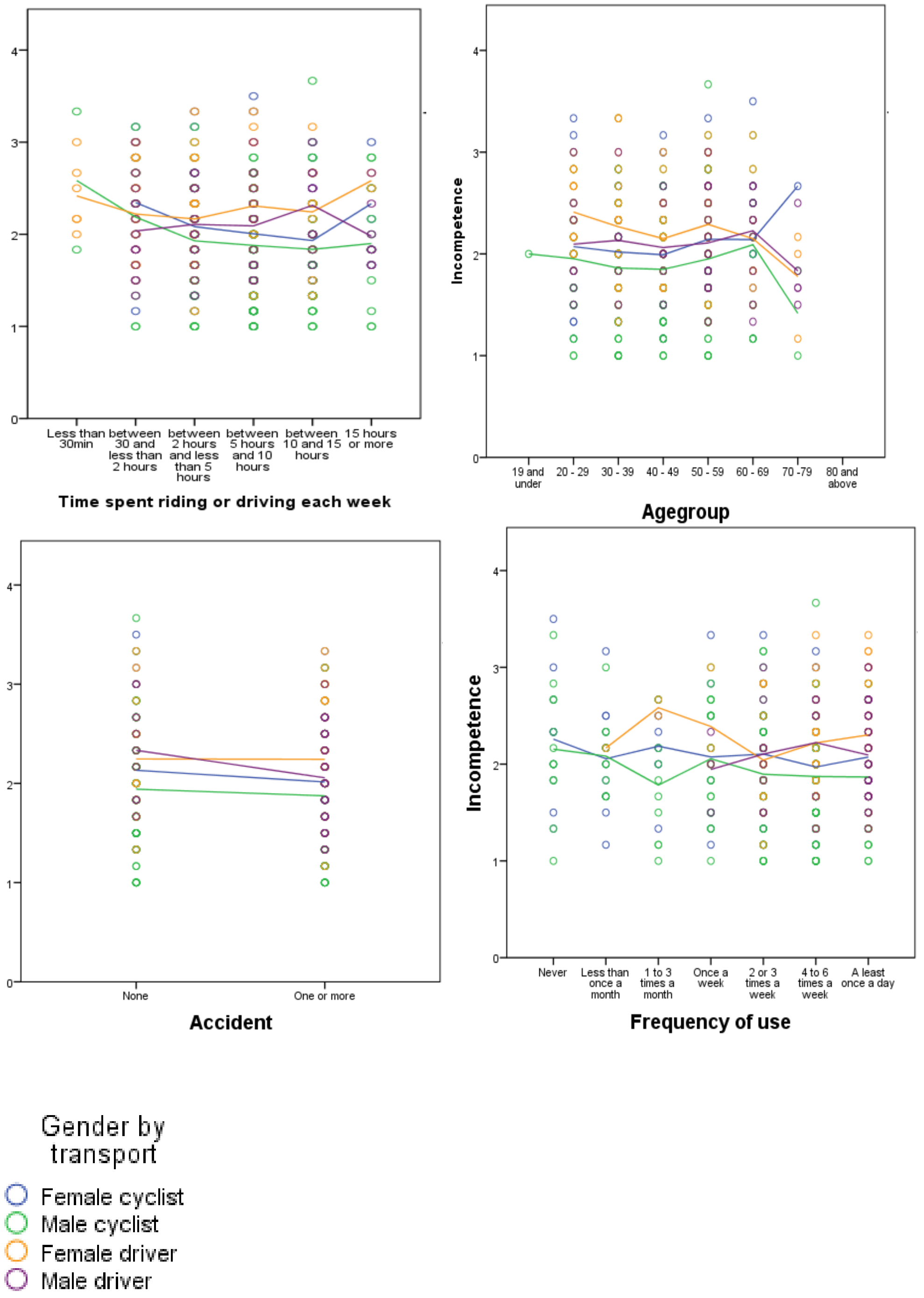
1= low to 5 =high

Figure B5 Scatter plots of perceived skill and self-reported frequency of violations



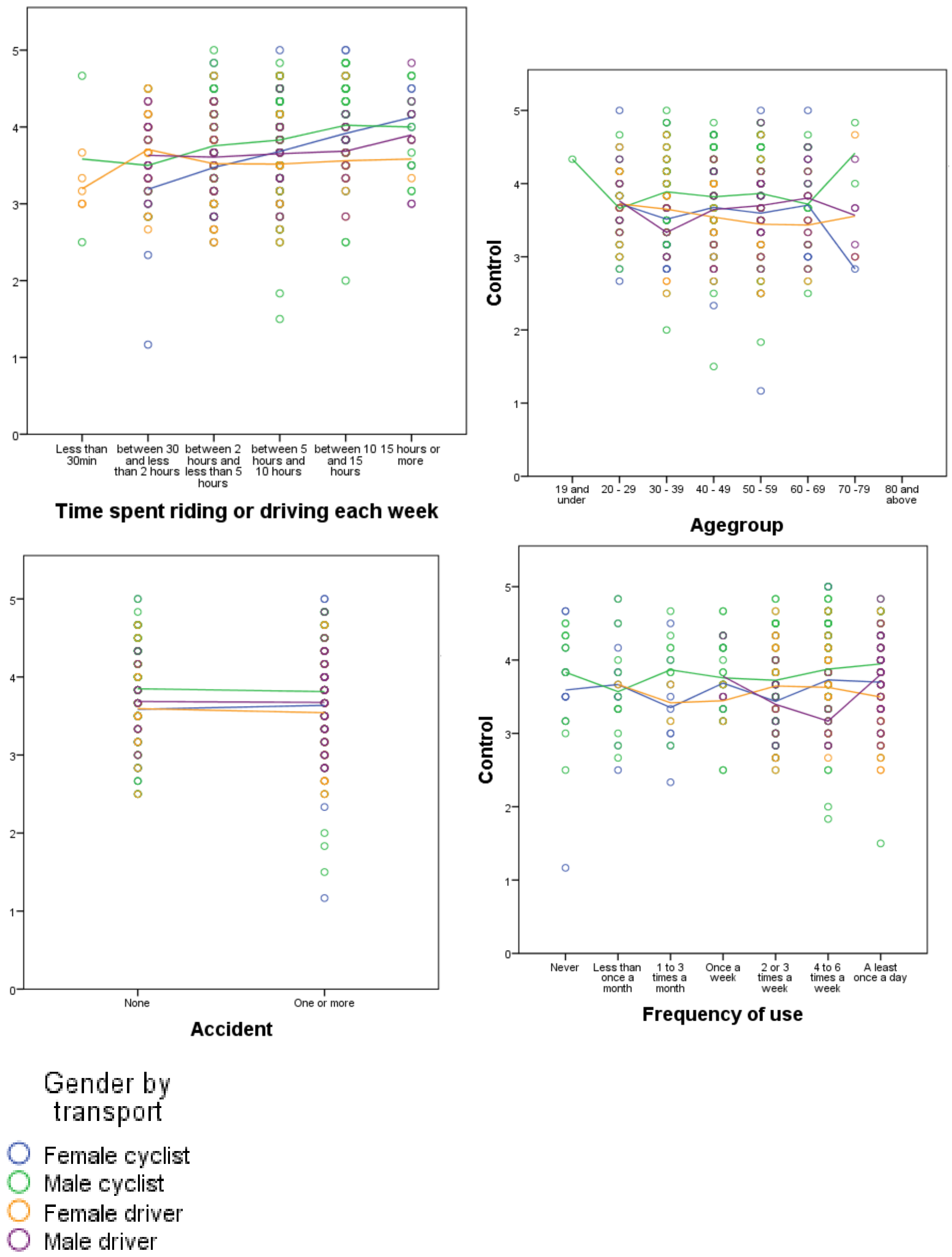
1= low risk to 5 =high risk,

Figure B6 Scatter plots of Overconfidence for male and female cyclist and driver



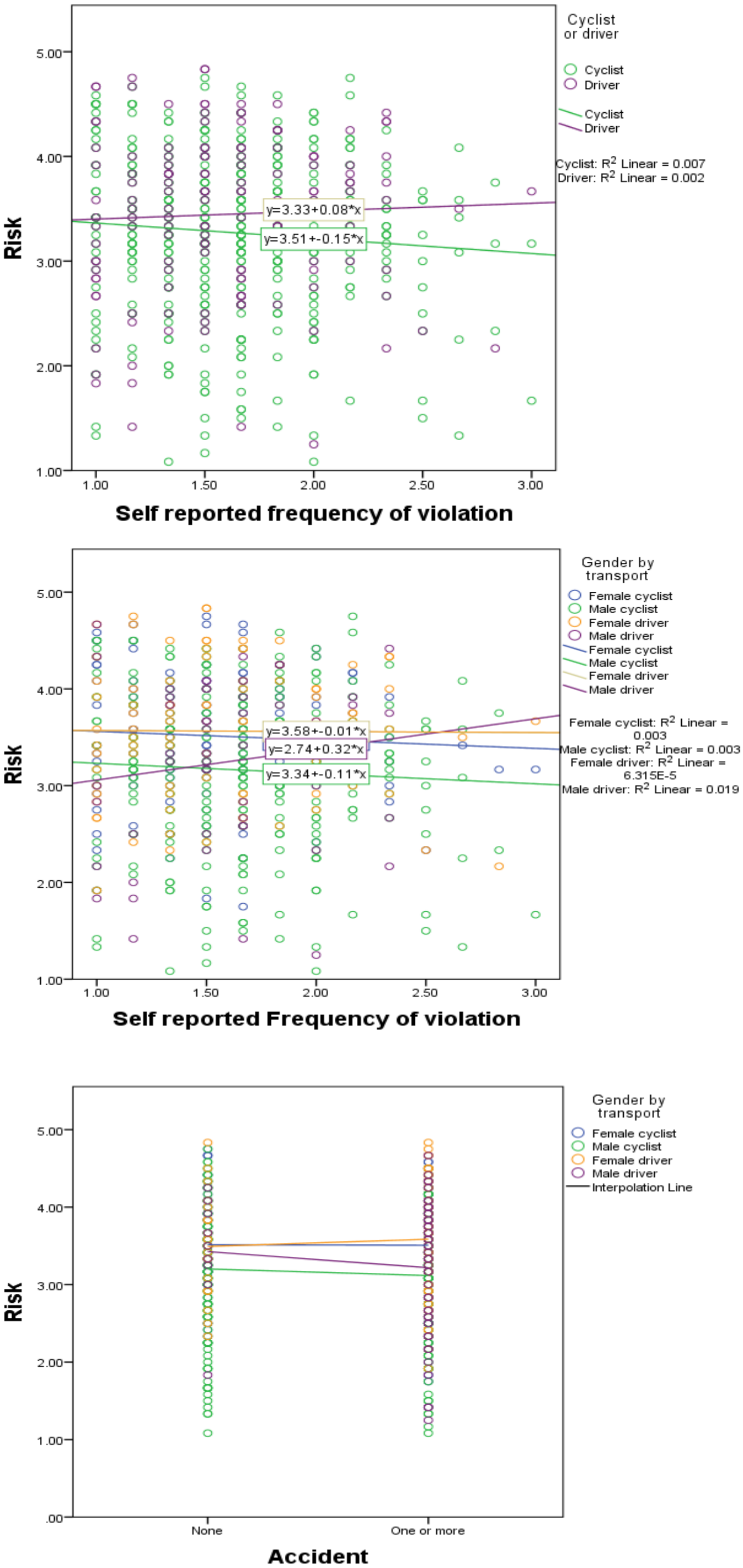
1= low risk to 5 =high risk

Figure B7 Scatter plots of Incompetence for male and female cyclist and driver



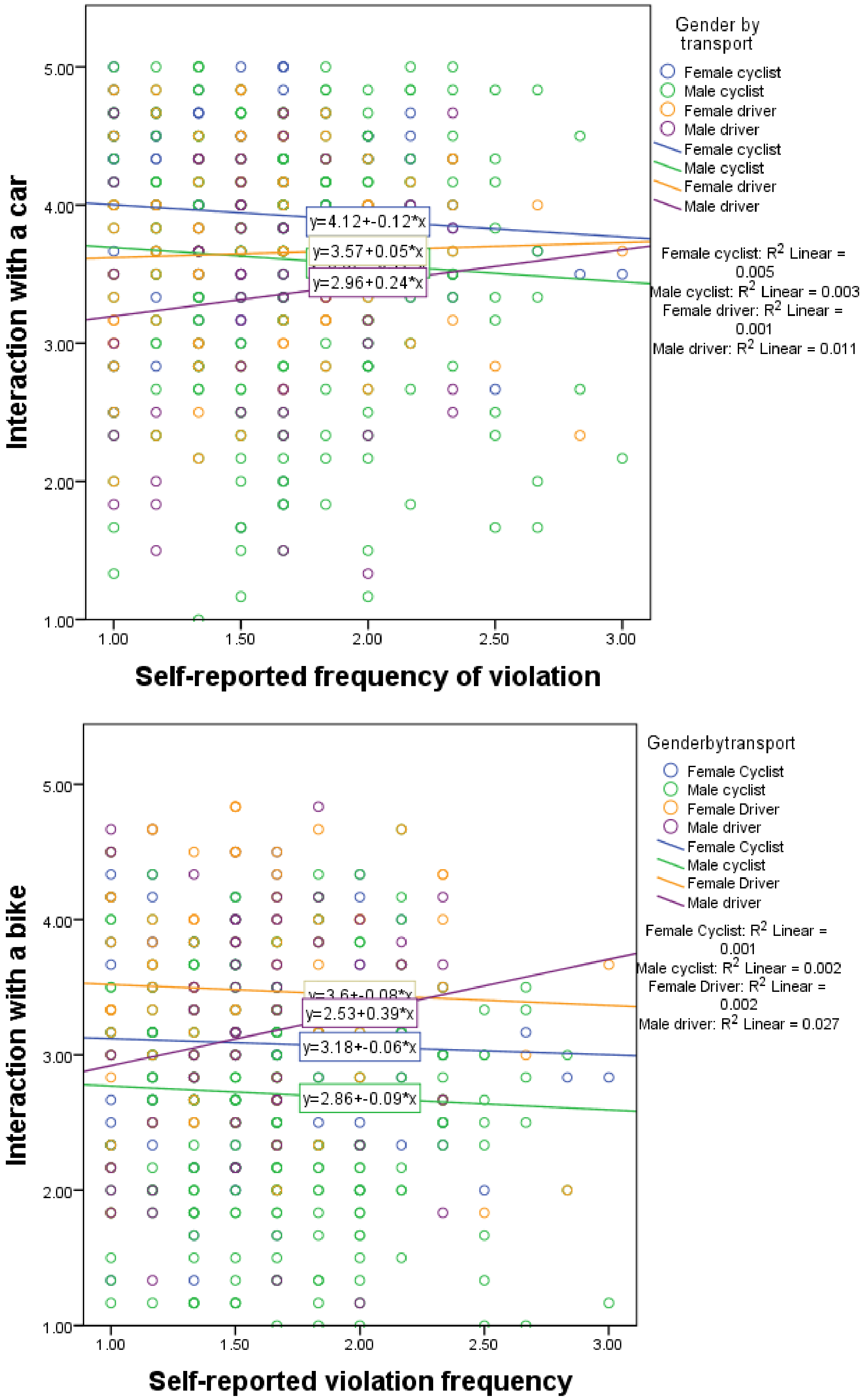
1= low risk to 5 =high risk

Figure B8 Scatter plots of Control for male and female cyclist and driver



1= low risk to 5 =high risk

Figure B9 Scatter plots of self-reported violation, accidents and perceived risk



1.00 never, 2.00Rarely, 3.00 Sometimes, 4.00 Often, 5.00 Very Often

Figure B10 Scatter plots of self-reported violation, gender and perceived risk

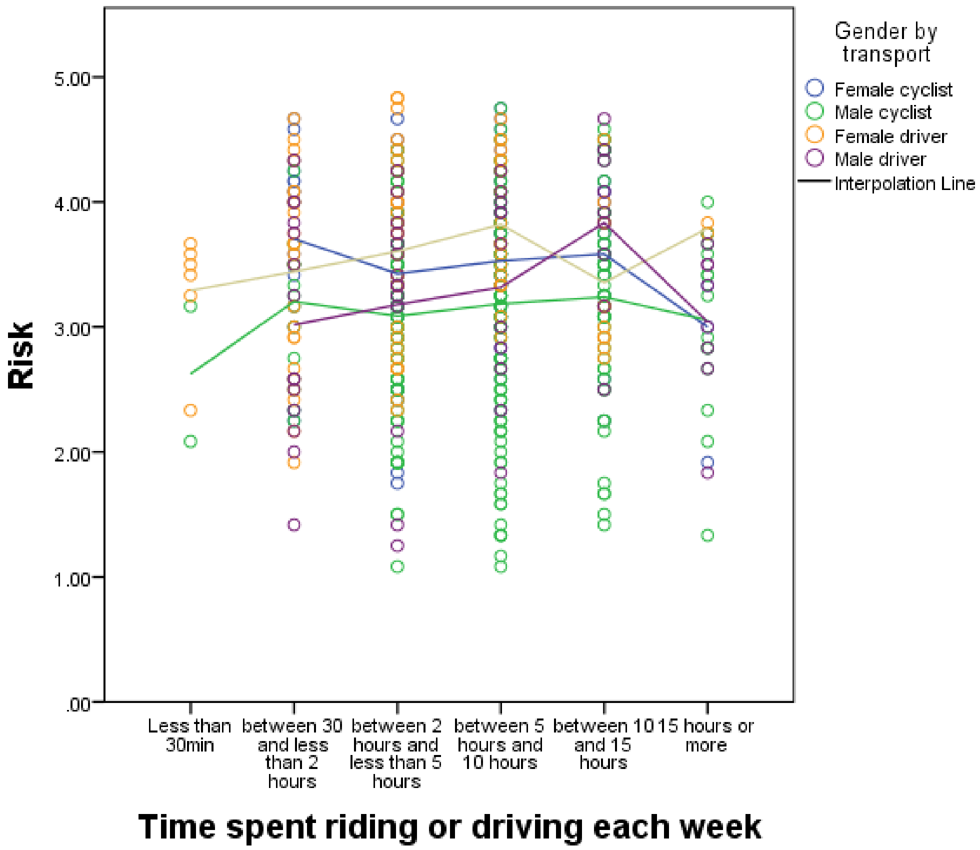


Figure B11 Scatter plot of time per week, gender and perceived risk

Appendix C

Table C1 Complete repeated measures ANOVA descriptive statistics
Complete Repeated Measures ANOVA

Within-Subjects Factors
Measure: MEASURE_1

Configuration		Situation	Dependent Variable
Cyclist Failing to yield		1	v1
Cyclist Going through a red light		2	v4
Cyclist Not signalling when turning		3	v7
Cyclist Swerving		4	v10
Cyclist Tailgating		5	v13
Cyclist Not checking traffic		6	v16
Driver Failing to yield		1	v2
Driver Going through a red light		2	v5
Driver Not signalling when turning		3	v8
Driver Swerving		4	v11
Driver Tailgating		5	v14
Driver Not checking traffic		6	v17
Between-Subjects Factors		Value Label	N
Cyclist or driver	1	Cyclist	444
2		Driver	151
Age group	2	20 - 29	69
3		30 - 39	128
4		40 - 49	156
5		50 - 59	175
6		60 - 69	56
7		70 -79	11
Gender	1	female	235
2		male	360

Cyclist Failing to yield	Age group	Gender	Mean Descriptive Statistics	Std. Deviation	N
Cyclist	20 - 29	female	3.00	0.87706	14
		male	2.52	1.00378	33
		Total	2.66	0.98415	47
	30 - 39	female	2.56	1.10698	36
		male	2.24	1.1818	67
		Total	2.35	1.1607	103
	40 - 49	female	2.56	0.94997	41
		male	2.14	0.99033	87
		Total	2.27	0.9938	128
	50 - 59	female	2.31	1.18251	35
		male	2.41	1.19997	93
		Total	2.38	1.19131	128
	60 - 69	female	2.92	1.11516	13
		male	2.45	1.26217	22
		Total	2.63	1.21476	35
	70 -79	female	1.00	0.000	1
		male	1.00	0	2
		Total	1.00	0	3
	Total	female	2.56	1.0743	140
		male	2.30	1.1254	304
		Total	2.38	1.11516	444
Driver	20 - 29	female	3.20	1.20712	15
		male	2.71	1.1127	7
		Total	3.05	1.17422	22
	30 - 39	female	3.00	1.07606	20
		male	2.60	1.14018	5
		Total	2.92	1.07703	25
	40 - 49	female	3.10	1.07115	20
		male	3.50	1.30931	8
		Total	3.21	1.13389	28
	50 - 59	female	3.19	1.0755	27
		male	3.10	1.25237	20
		Total	3.15	1.14168	47
	60 - 69	female	3.20	1.13529	10
		male	2.82	1.32802	11
		Total	3.00	1.22474	21
	70 -79	female	1.67	0.57735	3
		male	2.60	0.54772	5
		Total	2.25	0.70711	8
	Total	female	3.08	1.098	95
		male	2.96	1.19033	56
		Total	3.04	1.13067	151
Total	20 - 29	female	3.10	1.04693	29
		male	2.55	1.01147	40
		Total	2.78	1.05537	69
	30 - 39	female	2.71	1.10724	56
		male	2.26	1.17477	72
		Total	2.46	1.1631	128
	40 - 49	female	2.74	1.01492	61
		male	2.25	1.08145	95
		Total	2.44	1.07907	156
	50 - 59	female	2.69	1.2091	62
		male	2.53	1.23253	113
		Total	2.59	1.22328	175
	60 - 69	female	3.04	1.10693	23
		male	2.58	1.2755	33
		Total	2.77	1.22089	56
	70 -79	female	1.50	0.57735	4
		male	2.14	0.89974	7
		Total	1.91	0.83121	11
	Total	female	2.77	1.11141	235
		male	2.40	1.15943	360
		Total	2.55	1.15418	595

Cyclist Going through a red light	Age group	Gender	Mean Descriptive Statistics	Std. Deviation	N
Cyclist	20 – 29	female	2.93	1.14114	14
		male	2.94	0.9981	33
		Total	2.94	1.03008	47
	30 – 39	female	3.14	1.15022	36
		male	2.45	1.2096	67
		Total	2.69	1.22897	103
	40 – 49	female	3.22	1.03712	41
		male	2.33	1.07473	87
		Total	2.62	1.13721	128
	50 – 59	female	2.94	1.25892	35
		male	2.70	1.17755	93
		Total	2.77	1.20029	128
	60 – 69	female	3.31	1.31559	13
		male	2.41	1.33306	22
		Total	2.74	1.37932	35
	70 –79	female	1.00	.	1
		male	2.00	0	2
		Total	1.67	0.57735	3
	Total	female	3.09	1.16234	140
		male	2.54	1.15688	304
		Total	2.71	1.18557	444
Driver	20 – 29	female	3.60	1.18322	15
		male	3.00	0.8165	7
		Total	3.41	1.09801	22
	30 – 39	female	3.05	1.14593	20
		male	3.20	0.83666	5
		Total	3.08	1.07703	25
	40 – 49	female	3.65	0.87509	20
		male	3.38	1.30247	8
		Total	3.57	0.99735	28
	50 – 59	female	3.59	1.00992	27
		male	3.45	1.31689	20
		Total	3.53	1.13924	47
	60 – 69	female	3.90	0.8756	10
		male	3.00	1.34164	11
		Total	3.43	1.20712	21
	70 –79	female	1.67	0.57735	3
		male	2.80	0.83666	5
		Total	2.38	0.91613	8
	Total	female	3.46	1.0799	95
		male	3.21	1.17108	56
		Total	3.37	1.11723	151
Total	20 – 29	female	3.28	1.19213	29
		male	2.95	0.95943	40
		Total	3.09	1.06742	69
	30 – 39	female	3.11	1.13904	56
		male	2.50	1.19859	72
		Total	2.77	1.20683	128
	40 – 49	female	3.36	1.00055	61
		male	2.42	1.12589	95
		Total	2.79	1.16956	156
	50 – 59	female	3.23	1.19314	62
		male	2.83	1.23131	113
		Total	2.97	1.22909	175
	60 – 69	female	3.57	1.16096	23
		male	2.61	1.34488	33
		Total	3.00	1.3484	56
	70 –79	female	1.50	0.57735	4
		male	2.57	0.7868	7
		Total	2.18	0.87386	11
	Total	female	3.24	1.142	235
		male	2.64	1.18309	360
		Total	2.88	1.20222	595

Cyclist Not signalling when turning	Age group	Gender	Mean Descriptive Statistics	Std. Deviation	N
Cyclist	20 - 29	female	2.57	0.85163	14
		male	2.42	0.86712	33
		Total	2.47	0.85595	47
	30 - 39	female	2.94	1.094	36
		male	2.36	1.04013	67
		Total	2.56	1.09069	103
	40 - 49	female	2.95	0.80471	41
		male	2.31	1.0036	87
		Total	2.52	0.98799	128
	50 - 59	female	2.51	1.03955	35
		male	2.62	1.08261	93
		Total	2.59	1.06806	128
	60 - 69	female	3.23	1.01274	13
		male	2.68	1.08612	22
		Total	2.89	1.07844	35
	70 -79	female	4.00	.	1
		male	2.00	1.41421	2
		Total	2.67	1.52753	3
	Total	female	2.84	0.98631	140
		male	2.45	1.03304	304
		Total	2.57	1.03281	444
Driver	20 - 29	female	3.47	1.0601	15
		male	2.29	0.75593	7
		Total	3.09	1.1088	22
	30 - 39	female	2.85	1.1821	20
		male	2.80	0.83666	5
		Total	2.84	1.10604	25
	40 - 49	female	3.15	0.87509	20
		male	2.13	0.99103	8
		Total	2.86	1.00791	28
	50 - 59	female	3.30	1.03086	27
		male	2.65	1.1821	20
		Total	3.02	1.13232	47
	60 - 69	female	2.70	1.05935	10
		male	2.09	1.04447	11
		Total	2.38	1.07127	21
	70 -79	female	2.67	1.1547	3
		male	2.20	1.30384	5
		Total	2.38	1.18773	8
	Total	female	3.12	1.05046	95
		male	2.39	1.05621	56
		Total	2.85	1.10603	151
Total	20 - 29	female	3.03	1.05162	29
		male	2.40	0.84124	40
		Total	2.67	0.9802	69
	30 - 39	female	2.91	1.11644	56
		male	2.39	1.02854	72
		Total	2.62	1.09488	128
	40 - 49	female	3.02	0.82647	61
		male	2.29	0.99866	95
		Total	2.58	0.99702	156
	50 - 59	female	2.85	1.09913	62
		male	2.63	1.0954	113
		Total	2.71	1.09895	175
	60 - 69	female	3.00	1.04447	23
		male	2.48	1.0932	33
		Total	2.70	1.09411	56
	70 -79	female	3.00	1.1547	4
		male	2.14	1.21499	7
		Total	2.45	1.21356	11
	Total	female	2.95	1.01986	235
		male	2.44	1.03543	360
		Total	2.64	1.05765	595

Cyclist Swerving	Age group	Gender	Mean Descriptive Statistics	Std. Deviation	N
Cyclist	20 - 29	female	2.64	0.92878	14
		male	2.61	0.89928	33
		Total	2.62	0.89814	47
	30 - 39	female	2.86	1.01848	36
		male	2.51	1.1197	67
		Total	2.63	1.09357	103
	40 - 49	female	2.83	0.91931	41
		male	2.48	1.08758	87
		Total	2.59	1.04571	128
	50 - 59	female	2.54	1.19663	35
		male	2.72	1.14555	93
		Total	2.67	1.15772	128
	60 - 69	female	3.38	1.1209	13
		male	2.68	1.12911	22
		Total	2.94	1.16171	35
	70 -79	female	4.00	.	1
		male	1.50	0.70711	2
		Total	2.33	1.52753	3
	Total	female	2.81	1.05187	140
		male	2.58	1.09596	304
		Total	2.65	1.08612	444
Driver	20 - 29	female	3.60	0.98561	15
		male	3.00	1.29099	7
		Total	3.41	1.09801	22
	30 - 39	female	3.30	1.34164	20
		male	3.20	0.83666	5
		Total	3.28	1.24231	25
	40 - 49	female	3.75	0.96655	20
		male	3.63	1.06066	8
		Total	3.71	0.9759	28
	50 - 59	female	3.56	1.01274	27
		male	3.30	1.26074	20
		Total	3.45	1.11917	47
	60 - 69	female	3.80	1.22927	10
		male	3.09	1.3751	11
		Total	3.43	1.32557	21
	70 -79	female	3.00	1.73205	3
		male	3.20	1.09545	5
		Total	3.13	1.24642	8
	Total	female	3.56	1.10815	95
		male	3.25	1.17937	56
		Total	3.44	1.14097	151
Total	20 - 29	female	3.14	1.05979	29
		male	2.68	0.97106	40
		Total	2.87	1.02775	69
	30 - 39	female	3.02	1.15193	56
		male	2.56	1.11189	72
		Total	2.76	1.14841	128
	40 - 49	female	3.13	1.0243	61
		male	2.58	1.12589	95
		Total	2.79	1.11713	156
	50 - 59	female	2.98	1.22129	62
		male	2.82	1.18193	113
		Total	2.88	1.19501	175
	60 - 69	female	3.57	1.16096	23
		male	2.82	1.21075	33
		Total	3.13	1.23675	56
	70 -79	female	3.25	1.5	4
		male	2.71	1.25357	7
		Total	2.91	1.30035	11
	Total	female	3.11	1.1344	235
		male	2.69	1.13384	360
		Total	2.85	1.15198	595

Cyclist Not signalling when turning	Age group	Gender	Mean Descriptive Statistics	Std. Deviation	N
Cyclist	20 - 29	female	2.57	0.85163	14
		male	2.42	0.86712	33
		Total	2.47	0.85595	47
	30 - 39	female	2.94	1.094	36
		male	2.36	1.04013	67
		Total	2.56	1.09069	103
	40 - 49	female	2.95	0.80471	41
		male	2.31	1.0036	87
		Total	2.52	0.98799	128
	50 - 59	female	2.51	1.03955	35
		male	2.62	1.08261	93
		Total	2.59	1.06806	128
	60 - 69	female	3.23	1.01274	13
		male	2.68	1.08612	22
		Total	2.89	1.07844	35
	70 -79	female	4.00	.	1
		male	2.00	1.41421	2
		Total	2.67	1.52753	3
	Total	female	2.84	0.98631	140
		male	2.45	1.03304	304
		Total	2.57	1.03281	444
Driver	20 - 29	female	3.47	1.0601	15
		male	2.29	0.75593	7
		Total	3.09	1.1088	22
	30 - 39	female	2.85	1.1821	20
		male	2.80	0.83666	5
		Total	2.84	1.10604	25
	40 - 49	female	3.15	0.87509	20
		male	2.13	0.99103	8
		Total	2.86	1.00791	28
	50 - 59	female	3.30	1.03086	27
		male	2.65	1.1821	20
		Total	3.02	1.13232	47
	60 - 69	female	2.70	1.05935	10
		male	2.09	1.04447	11
		Total	2.38	1.07127	21
	70 -79	female	2.67	1.1547	3
		male	2.20	1.30384	5
		Total	2.38	1.18773	8
	Total	female	3.12	1.05046	95
		male	2.39	1.05621	56
		Total	2.85	1.10603	151
Total	20 - 29	female	3.03	1.05162	29
		male	2.40	0.84124	40
		Total	2.67	0.9802	69
	30 - 39	female	2.91	1.11644	56
		male	2.39	1.02854	72
		Total	2.62	1.09488	128
	40 - 49	female	3.02	0.82647	61
		male	2.29	0.99866	95
		Total	2.58	0.99702	156
	50 - 59	female	2.85	1.09913	62
		male	2.63	1.0954	113
		Total	2.71	1.09895	175
	60 - 69	female	3.00	1.04447	23
		male	2.48	1.0932	33
		Total	2.70	1.09411	56
	70 -79	female	3.00	1.1547	4
		male	2.14	1.21499	7
		Total	3.36	1.20605	11
	Total	female	3.81	0.89577	235
		male	3.44	1.05145	360
		Total	3.59	1.00833	595

Cyclist Not checking traffic	Age group	Gender	Mean Descriptive Statistics	Std. Deviation	N
Cyclist	20 - 29	female	3.50	1.09193	14
		male	3.33	0.88976	33
		Total	3.38	0.94531	47
	30 - 39	female	3.50	0.97101	36
		male	2.96	1.23623	67
		Total	3.15	1.17497	103
	40 - 49	female	3.41	0.97405	41
		male	2.93	1.09749	87
		Total	3.09	1.07972	128
	50 - 59	female	3.14	1.11521	35
		male	3.00	1.24237	93
		Total	3.04	1.2063	128
	60 - 69	female	3.92	0.86232	13
		male	2.68	1.2868	22
		Total	3.14	1.28665	35
	70 -79	female	2.00	.	1
		male	2.00	0	2
		Total	2.00	0	3
	Total	female	3.41	1.02477	140
		male	2.98	1.17009	304
		Total	3.11	1.14338	444
Driver	20 - 29	female	3.67	1.1127	15
		male	3.86	1.06904	7
		Total	3.73	1.07711	22
	30 - 39	female	3.80	1.10501	20
		male	3.00	0.70711	5
		Total	3.64	1.07548	25
	40 - 49	female	4.00	0.8584	20
		male	3.50	1.06904	8
		Total	3.86	0.93152	28
	50 - 59	female	4.00	1	27
		male	3.65	1.08942	20
		Total	3.85	1.04213	47
	60 - 69	female	3.40	1.7127	10
		male	3.45	1.50756	11
		Total	3.43	1.56753	21
	70 -79	female	2.33	2.3094	3
		male	3.00	1.41421	5
		Total	2.75	1.66905	8
	Total	female	3.79	1.16596	95
		male	3.50	1.15994	56
		Total	3.68	1.16831	151
Total	20 - 29	female	3.59	1.08619	29
		male	3.43	0.9306	40
		Total	3.49	0.99444	69
	30 - 39	female	3.61	1.0212	56
		male	2.96	1.20372	72
		Total	3.24	1.16879	128
	40 - 49	female	3.61	0.97089	61
		male	2.98	1.10105	95
		Total	3.22	1.09293	156
	50 - 59	female	3.52	1.1415	62
		male	3.12	1.23745	113
		Total	3.26	1.21634	175
	60 - 69	female	3.70	1.29456	23
		male	2.94	1.39058	33
		Total	3.25	1.39153	56
	70 -79	female	2.25	1.89297	4
		male	2.71	1.25357	7
		Total	2.55	1.4397	11
	Total	female	3.57	1.09725	235
		male	3.06	1.18224	360
		Total	3.26	1.17504	595

Car driver Failing to yield	Age group	Gender	Mean Descriptive Statistics	Std. Deviation	N
Cyclist	20 - 29	female	4.50	0.94054	14
		male	4.15	0.75503	33
		Total	4.26	0.82008	47
	30 - 39	female	3.86	0.76168	36
		male	3.90	0.81899	67
		Total	3.88	0.79583	103
	40 - 49	female	3.85	0.98896	41
		male	3.70	1.11141	87
		Total	3.75	1.0722	128
	50 - 59	female	3.94	1.18676	35
		male	3.84	1.01393	93
		Total	3.87	1.06017	128
	60 - 69	female	4.00	0.8165	13
		male	3.36	1.21677	22
		Total	3.60	1.11672	35
	70 -79	female	3.00	.	1
		male	3.00	2.82843	2
		Total	3.00	2	3
	Total	female	3.95	0.97689	140
		male	3.81	1.01726	304
		Total	3.85	1.00584	444
Driver	20 - 29	female	3.20	1.20712	15
		male	2.86	1.21499	7
		Total	3.09	1.1916	22
	30 - 39	female	3.20	1.05631	20
		male	2.20	0.83666	5
		Total	3.00	1.08012	25
	40 - 49	female	3.05	0.99868	20
		male	3.50	1.19523	8
		Total	3.18	1.05597	28
	50 - 59	female	3.15	1.16697	27
		male	3.30	1.26074	20
		Total	3.21	1.19667	47
	60 - 69	female	3.20	1.39841	10
		male	2.64	1.02691	11
		Total	2.90	1.22085	21
	70 -79	female	3.33	0.57735	3
		male	2.80	0.83666	5
		Total	3.00	0.75593	8
	Total	female	3.16	1.1043	95
		male	3.00	1.15994	56
		Total	3.10	1.12401	151
Total	20 - 29	female	3.83	1.25553	29
		male	3.93	0.97106	40
		Total	3.88	1.0919	69
	30 - 39	female	3.63	0.92564	56
		male	3.78	0.92268	72
		Total	3.71	0.92347	128
	40 - 49	female	3.59	1.05478	61
		male	3.68	1.11339	95
		Total	3.65	1.08838	156
	50 - 59	female	3.60	1.23421	62
		male	3.74	1.07553	113
		Total	3.69	1.13294	175
	60 - 69	female	3.65	1.15242	23
		male	3.12	1.19262	33
		Total	3.34	1.19509	56
	70 -79	female	3.25	0.5	4
		male	2.86	1.34519	7
		Total	3.00	1.09545	11
	Total	female	3.63	1.09932	235
		male	3.68	1.07939	360
		Total	3.66	1.08667	595

Driver Going through a red light	Age group	Gender	Mean Descriptive Statistics	Std. Deviation	N
Cyclist	20 - 29	female	3.93	1.38477	14
		male	4.09	0.97991	33
		Total	4.04	1.10252	47
	30 - 39	female	4.31	0.92023	36
		male	3.88	1.33169	67
		Total	4.03	1.21636	103
	40 - 49	female	4.41	0.59058	41
		male	3.68	1.22469	87
		Total	3.91	1.11558	128
	50 - 59	female	4.29	1.10004	35
		male	3.82	1.07285	93
		Total	3.95	1.09623	128
	60 - 69	female	3.92	1.18754	13
		male	3.18	1.40192	22
		Total	3.46	1.35783	35
	70 -79	female	1.00	.	1
		male	2.00	0	2
		Total	1.67	0.57735	3
	Total	female	4.24	1.00796	140
		male	3.76	1.20908	304
		Total	3.91	1.16918	444
Driver	20 - 29	female	4.27	0.70373	15
		male	3.71	0.48795	7
		Total	4.09	0.68376	22
	30 - 39	female	3.90	1.07115	20
		male	3.20	0.83666	5
		Total	3.76	1.05198	25
	40 - 49	female	3.80	0.95145	20
		male	3.75	1.28174	8
		Total	3.79	1.03126	28
	50 - 59	female	3.85	0.94883	27
		male	3.55	1.2763	20
		Total	3.72	1.09747	47
	60 - 69	female	4.00	1.05409	10
		male	2.91	1.446	11
		Total	3.43	1.36277	21
	70 -79	female	3.00	1	3
		male	2.80	1.09545	5
		Total	2.88	0.99103	8
	Total	female	3.91	0.95732	95
		male	3.38	1.19943	56
		Total	3.71	1.08068	151
Total	20 - 29	female	4.10	1.0805	29
		male	4.03	0.91952	40
		Total	4.06	0.98345	69
	30 - 39	female	4.16	0.98676	56
		male	3.83	1.31084	72
		Total	3.98	1.18697	128
	40 - 49	female	4.21	0.77706	61
		male	3.68	1.22269	95
		Total	3.89	1.09882	156
	50 - 59	female	4.10	1.0513	62
		male	3.77	1.11009	113
		Total	3.89	1.09784	175
	60 - 69	female	3.96	1.10693	23
		male	3.09	1.40008	33
		Total	3.45	1.34732	56
	70 -79	female	2.50	1.29099	4
		male	2.57	0.9759	7
		Total	2.55	1.03573	11
	Total	female	4.10	0.99904	235
		male	3.70	1.21412	360
		Total	3.86	1.1499	595

Driver Not signalling when turning	Age group	Gender	Mean Descriptive Statistics	Std. Deviation	N
Cyclist	20 - 29	female	3.57	1.08941	14
		male	3.61	1.2232	33
		Total	3.60	1.17324	47
	30 - 39	female	3.53	1.02779	36
		male	3.24	1.07435	67
		Total	3.34	1.06231	103
	40 - 49	female	3.61	0.91864	41
		male	3.31	1.07087	87
		Total	3.41	1.03054	128
	50 - 59	female	3.54	0.98048	35
		male	3.41	1.08584	93
		Total	3.45	1.05598	128
	60 - 69	female	3.85	0.68874	13
		male	3.41	1.00755	22
		Total	3.57	0.9167	35
	70 -79	female	2.00	.	1
		male	2.00	1.41421	2
		Total	2.00	1	3
	Total	female	3.58	0.96012	140
		male	3.36	1.09248	304
		Total	3.43	1.05658	444
Driver	20 - 29	female	3.40	1.12122	15
		male	2.43	0.9759	7
		Total	3.09	1.15095	22
	30 - 39	female	2.90	1.07115	20
		male	2.60	1.14018	5
		Total	2.84	1.06771	25
	40 - 49	female	3.05	0.88704	20
		male	3.00	1.19523	8
		Total	3.04	0.96156	28
	50 - 59	female	3.30	0.8689	27
		male	3.05	1.19097	20
		Total	3.19	1.01378	47
	60 - 69	female	2.70	1.05935	10
		male	2.82	1.16775	11
		Total	2.76	1.09109	21
	70 -79	female	3.67	0.57735	3
		male	2.60	1.34164	5
		Total	3.00	1.19523	8
	Total	female	3.13	0.98112	95
		male	2.84	1.1406	56
		Total	3.02	1.04862	151
Total	20 - 29	female	3.48	1.08958	29
		male	3.40	1.25678	40
		Total	3.43	1.1817	69
	30 - 39	female	3.30	1.07736	56
		male	3.19	1.08302	72
		Total	3.24	1.07766	128
	40 - 49	female	3.43	0.93913	61
		male	3.28	1.07845	95
		Total	3.34	1.02546	156
	50 - 59	female	3.44	0.93425	62
		male	3.35	1.10817	113
		Total	3.38	1.04801	175
	60 - 69	female	3.35	1.0273	23
		male	3.21	1.08275	33
		Total	3.27	1.05298	56
	70 -79	female	3.25	0.95743	4
		male	2.43	1.27242	7
		Total	2.73	1.19087	11
	Total	female	3.40	0.99184	235
		male	3.28	1.11432	360
		Total	3.59	1.00833	595

Driver Swerving	Age group	Gender	Mean Descriptive Statistics	Std. Deviation	N
Cyclist	20 - 29	female	3.36	1.00821	14
		male	3.67	0.98953	33
		Total	3.57	0.99443	47
	30 - 39	female	3.61	0.99363	36
		male	3.24	1.21966	67
		Total	3.37	1.15462	103
	40 - 49	female	3.78	0.90863	41
		male	3.28	1.25466	87
		Total	3.44	1.17554	128
	50 - 59	female	3.63	1.00252	35
		male	3.48	1.1479	93
		Total	3.52	1.10806	128
	60 - 69	female	3.85	0.9871	13
		male	3.45	1.1434	22
		Total	3.60	1.09006	35
	70 -79	female	2.00	.	1
		male	1.50	0.70711	2
		Total	1.67	0.57735	3
	Total	female	3.65	0.97394	140
		male	3.38	1.18746	304
		Total	3.46	1.13068	444
Driver	20 - 29	female	3.67	0.9759	15
		male	3.29	1.60357	7
		Total	3.55	1.18431	22
	30 - 39	female	3.65	1.26803	20
		male	3.40	0.89443	5
		Total	3.60	1.19024	25
	40 - 49	female	3.60	0.88258	20
		male	3.63	1.06066	8
		Total	3.61	0.91649	28
	50 - 59	female	3.56	0.97402	27
		male	3.75	0.91047	20
		Total	3.64	0.94237	47
	60 - 69	female	3.80	1.31656	10
		male	3.09	1.13618	11
		Total	3.43	1.24786	21
	70 -79	female	3.33	1.1547	3
		male	3.20	1.09545	5
		Total	3.25	1.0351	8
	Total	female	3.62	1.04351	95
		male	3.46	1.07812	56
		Total	3.56	1.05563	151
Total	20 - 29	female	3.52	0.98636	29
		male	3.60	1.10477	40
		Total	3.57	1.04991	69
	30 - 39	female	3.63	1.08816	56
		male	3.25	1.19565	72
		Total	3.41	1.16055	128
	40 - 49	female	3.72	0.89687	61
		male	3.31	1.23834	95
		Total	3.47	1.13262	156
	50 - 59	female	3.60	0.9828	62
		male	3.53	1.11059	113
		Total	3.55	1.06467	175
	60 - 69	female	3.83	1.11405	23
		male	3.33	1.13652	33
		Total	3.54	1.14359	56
	70 -79	female	3.00	1.1547	4
		male	2.71	1.25357	7
		Total	2.82	1.16775	11
	Total	female	3.64	1.00055	235
		male	3.39	1.17014	360
		Total	3.49	1.11211	595

Driver Tailgating	Age group	Gender	Mean Descriptive Statistics	Std. Deviation	N
Cyclist	20 - 29	female	4.29	0.82542	14
		male	4.36	0.69903	33
		Total	4.34	0.73059	47
	30 - 39	female	4.25	0.93732	36
		male	3.81	1.09044	67
		Total	3.96	1.05647	103
	40 - 49	female	4.37	0.69843	41
		male	3.75	1.19318	87
		Total	3.95	1.09623	128
	50 - 59	female	3.91	0.9509	35
		male	3.86	1.09932	93
		Total	3.88	1.05741	128
	60 - 69	female	4.38	0.65044	13
		male	3.73	1.20245	22
		Total	3.97	1.07062	35
	70 -79	female	2.00	.	1
		male	2.00	1.41421	2
		Total	2.00	1	3
	Total	female	4.20	0.86665	140
		male	3.85	1.11551	304
		Total	3.96	1.05521	444
Driver	20 - 29	female	4.20	0.7746	15
		male	4.00	1.1547	7
		Total	4.14	0.88884	22
	30 - 39	female	4.20	0.89443	20
		male	4.00	1	5
		Total	4.16	0.89815	25
	40 - 49	female	4.10	0.85224	20
		male	4.38	1.06066	8
		Total	4.18	0.90487	28
	50 - 59	female	4.07	0.72991	27
		male	4.00	1.02598	20
		Total	4.04	0.85865	47
	60 - 69	female	4.10	1.19722	10
		male	3.55	0.8202	11
		Total	3.81	1.03049	21
	70 -79	female	4.00	0	3
		male	3.60	0.54772	5
		Total	3.75	0.46291	8
	Total	female	4.13	0.82825	95
		male	3.93	0.96967	56
		Total	4.05	0.88535	151
Total	20 - 29	female	4.24	0.78627	29
		male	4.30	0.79097	40
		Total	4.28	0.78373	69
	30 - 39	female	4.23	0.91435	56
		male	3.82	1.07895	72
		Total	4.00	1.02719	128
	40 - 49	female	4.28	0.75567	61
		male	3.80	1.19039	95
		Total	3.99	1.06551	156
	50 - 59	female	3.98	0.85874	62
		male	3.89	1.08358	113
		Total	3.92	1.00824	175
	60 - 69	female	4.26	0.91539	23
		male	3.67	1.08012	33
		Total	3.91	1.04927	56
	70 -79	female	3.50	1	4
		male	3.14	1.06904	7
		Total	3.27	1.00905	11
	Total	female	4.17	0.85032	235
		male	3.86	1.09322	360
		Total	3.98	1.0149	595

Driver Not checking traffic	Age group	Gender	Mean Descriptive Statistics	Std. Deviation	N
Cyclist	20 - 29	female	3.93	0.91687	14
		male	3.61	1.19738	33
		Total	3.70	1.12124	47
	30 - 39	female	4.14	1.01848	36
		male	3.37	1.36887	67
		Total	3.64	1.305	103
	40 - 49	female	4.10	0.96966	41
		male	3.53	1.31042	87
		Total	3.71	1.23691	128
	50 - 59	female	3.74	1.24482	35
		male	3.59	1.41603	93
		Total	3.63	1.36821	128
	60 - 69	female	4.23	0.59914	13
		male	3.41	1.43623	22
		Total	3.71	1.25021	35
	70 -79	female	2.00	.	1
		male	2.00	0	2
		Total	2.00	0	3
	Total	female	4.00	1.03882	140
		male	3.50	1.34973	304
		Total	3.66	1.27985	444
Driver	20 - 29	female	4.20	0.7746	15
		male	3.86	1.06904	7
		Total	4.09	0.8679	22
	30 - 39	female	3.95	1.05006	20
		male	3.20	0.83666	5
		Total	3.80	1.04083	25
	40 - 49	female	4.10	0.64072	20
		male	3.63	1.06066	8
		Total	3.96	0.79266	28
	50 - 59	female	4.07	0.99715	27
		male	3.40	1.09545	20
		Total	3.79	1.08219	47
	60 - 69	female	3.70	1.56702	10
		male	3.55	1.50756	11
		Total	3.62	1.49921	21
	70 -79	female	2.33	2.3094	3
		male	2.80	1.30384	5
		Total	2.63	1.59799	8
	Total	female	3.98	1.0617	95
		male	3.45	1.15868	56
		Total	3.78	1.12484	151
Total	20 - 29	female	4.07	0.84223	29
		male	3.65	1.16685	40
		Total	3.83	1.05658	69
	30 - 39	female	4.07	1.02438	56
		male	3.36	1.33539	72
		Total	3.67	1.2556	128
	40 - 49	female	4.10	0.86996	61
		male	3.54	1.28668	95
		Total	3.76	1.17155	156
	50 - 59	female	3.89	1.1467	62
		male	3.56	1.36236	113
		Total	3.67	1.2964	175
	60 - 69	female	4.00	1.12815	23
		male	3.45	1.43812	33
		Total	3.68	1.33631	56
	70 -79	female	2.25	1.89297	4
		male	2.57	1.13389	7
		Total	2.45	1.36848	11
	Total	female	3.99	1.04592	235
		male	3.49	1.32049	360
		Total	3.69	1.24255	595

Table C2 Box Test of Equality of Covariance Matrices

Box's Test of Equality of Covariance Matrices	
Box's M	1757.972
F	1.267
df1	1092
df2	39510.68
Sig.	.000

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.
a Design: Intercept + Control + Overconfidence + Incompetence + Violation+ Weekly time +monthly use + Driver Cyclist + Age group + gender + Driver Cyclist Age group + Driver Cyclist * gender + Age group * gender+ Driver Cyclist * Age group gender
Within Subjects Design: Configuration + Situation + Configurations' * Situation

Table C3 Multivariate test

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Configuration (Cyclist or Driver)	Pillai's Trace	0	.094b	1	565	0.759	0
	Wilks' Lambda	1	.094b	1	565	0.759	0
	Hotelling's Trace	0	.094b	1	565	0.759	0
	Roy's Largest Root	0	.094b	1	565	0.759	0
Configuration * Control	Pillai's Trace	0.001	.516b	1	565	0.473	0.001
	Wilks' Lambda	0.999	.516b	1	565	0.473	0.001
	Hotelling's Trace	0.001	.516b	1	565	0.473	0.001
	Roy's Largest Root	0.001	.516b	1	565	0.473	0.001
Configurations * Overconfidence	Pillai's Trace	0.018	10.104b	1	565	0.002	0.018
	Wilks' Lambda	0.982	10.104b	1	565	0.002	0.018
	Hotelling's Trace	0.018	10.104b	1	565	0.002	0.018
	Roy's Largest Root	0.018	10.104b	1	565	0.002	0.018
Configuration * Incompetence	Pillai's Trace	0.005	2.899b	1	565	0.089	0.005
	Wilks' Lambda	0.995	2.899b	1	565	0.089	0.005
	Hotelling's Trace	0.005	2.899b	1	565	0.089	0.005
	Roy's Largest Root	0.005	2.899b	1	565	0.089	0.005
Configuration * Violation	Pillai's Trace	0	.123b	1	565	0.726	0
	Wilks' Lambda	1	.123b	1	565	0.726	0
	Hotelling's Trace	0	.123b	1	565	0.726	0
	Roy's Largest Root	0	.123b	1	565	0.726	0
Configuration * weekly time	Pillai's Trace	0.003	1.642b	1	565	0.201	0.003
	Wilks' Lambda	0.997	1.642b	1	565	0.201	0.003
	Hotelling's Trace	0.003	1.642b	1	565	0.201	0.003
	Roy's Largest Root	0.003	1.642b	1	565	0.201	0.003
Configuration * monthly use	Pillai's Trace	0.001	.661b	1	565	0.417	0.001

	Wilks' Lambda	0.999	.661b	1	565	0.417	0.001
	Hotelling's Trace	0.001	.661b	1	565	0.417	0.001
	Roy's Largest Root	0.001	.661b	1	565	0.417	0.001
Configuration * Driver Cyclist	Pillai's Trace	0.031	18.006b	1	565	.000	0.031
	Wilks' Lambda	0.969	18.006b	1	565	.000	0.031
	Hotelling's Trace	0.032	18.006b	1	565	.000	0.031
	Roy's Largest Root	0.032	18.006b	1	565	.000	0.031
Configuration * Age group	Pillai's Trace	0.012	1.349b	5	565	0.242	0.012
	Wilks' Lambda	0.988	1.349b	5	565	0.242	0.012
	Hotelling's Trace	0.012	1.349b	5	565	0.242	0.012
	Roy's Largest Root	0.012	1.349b	5	565	0.242	0.012
Configuration * gender	Pillai's Trace	0	.000b	1	565	0.989	0
	Wilks' Lambda	1	.000b	1	565	0.989	0
	Hotelling's Trace	0	.000b	1	565	0.989	0
	Roy's Largest Root	0	.000b	1	565	0.989	0
Configuration * Driver Cyclist * Age group	Pillai's Trace	0.013	1.473b	5	565	0.197	0.013
	Wilks' Lambda	0.987	1.473b	5	565	0.197	0.013
	Hotelling's Trace	0.013	1.473b	5	565	0.197	0.013
	Roy's Largest Root	0.013	1.473b	5	565	0.197	0.013
Configuration * Driver Cyclist * gender	Pillai's Trace	0.004	2.362b	1	565	0.125	0.004
	Wilks' Lambda	0.996	2.362b	1	565	0.125	0.004
	Hotelling's Trace	0.004	2.362b	1	565	0.125	0.004
	Roy's Largest Root	0.004	2.362b	1	565	0.125	0.004
Configuration * Age group * gender	Pillai's Trace	0.005	.514b	5	565	0.765	0.005
	Wilks' Lambda	0.995	.514b	5	565	0.765	0.005
	Hotelling's Trace	0.005	.514b	5	565	0.765	0.005
	Roy's Largest Root	0.005	.514b	5	565	0.765	0.005
Configurations’ * Driver Cyclist * Age group * gender	Pillai's Trace	0.011	1.292b	5	565	0.266	0.011
	Wilks' Lambda	0.989	1.292b	5	565	0.266	0.011
	Hotelling's Trace	0.011	1.292b	5	565	0.266	0.011
	Roy's Largest Root	0.011	1.292b	5	565	0.266	0.011
Situation	Pillai's Trace	0.015	1.668b	5	561	0.14	0.015
	Wilks' Lambda	0.985	1.668b	5	561	0.14	0.015
	Hotelling's Trace	0.015	1.668b	5	561	0.14	0.015
	Roy's Largest Root	0.015	1.668b	5	561	0.14	0.015
Situation * Control	Pillai's Trace	0.01	1.123b	5	561	0.347	0.01
	Wilks' Lambda	0.99	1.123b	5	561	0.347	0.01
	Hotelling's Trace	0.01	1.123b	5	561	0.347	0.01
	Roy's Largest Root	0.01	1.123b	5	561	0.347	0.01
Situation * Overconfidence	Pillai's Trace	0.018	2.027b	5	561	0.073	0.018

	Wilks' Lambda	0.982	2.027b	5	561	0.073	0.018
	Hotelling's Trace	0.018	2.027b	5	561	0.073	0.018
	Roy's Largest Root	0.018	2.027b	5	561	0.073	0.018
Situation * Incompetence	Pillai's Trace	0.003	.316b	5	561	0.903	0.003
	Wilks' Lambda	0.997	.316b	5	561	0.903	0.003
	Hotelling's Trace	0.003	.316b	5	561	0.903	0.003
	Roy's Largest Root	0.003	.316b	5	561	0.903	0.003
Situation * Violation	Pillai's Trace	0.006	.688b	5	561	0.633	0.006
	Wilks' Lambda	0.994	.688b	5	561	0.633	0.006
	Hotelling's Trace	0.006	.688b	5	561	0.633	0.006
	Roy's Largest Root	0.006	.688b	5	561	0.633	0.006
Situation * weekly time	Pillai's Trace	0.005	.532b	5	561	0.752	0.005
	Wilks' Lambda	0.995	.532b	5	561	0.752	0.005
	Hotelling's Trace	0.005	.532b	5	561	0.752	0.005
	Roy's Largest Root	0.005	.532b	5	561	0.752	0.005
Situation * monthly use	Pillai's Trace	0.009	1.067b	5	561	0.377	0.009
	Wilks' Lambda	0.991	1.067b	5	561	0.377	0.009
	Hotelling's Trace	0.01	1.067b	5	561	0.377	0.009
	Roy's Largest Root	0.01	1.067b	5	561	0.377	0.009
Situation * Driver Cyclist	Pillai's Trace	0.033	3.777b	5	561	0.002	0.033
	Wilks' Lambda	0.967	3.777b	5	561	0.002	0.033
	Hotelling's Trace	0.034	3.777b	5	561	0.002	0.033
	Roy's Largest Root	0.034	3.777b	5	561	0.002	0.033
Situation * Age group	Pillai's Trace	0.053	1.216	25	2825	0.211	0.011
	Wilks' Lambda	0.948	1.216	25	2085.524	0.211	0.011
	Hotelling's Trace	0.054	1.215	25	2797	0.212	0.011
	Roy's Largest Root	0.028	3.156c	5	565	0.008	0.027
Situation * gender	Pillai's Trace	0.007	.817b	5	561	0.538	0.007
	Wilks' Lambda	0.993	.817b	5	561	0.538	0.007
	Hotelling's Trace	0.007	.817b	5	561	0.538	0.007
	Roy's Largest Root	0.007	.817b	5	561	0.538	0.007
Situation * Driver Cyclist * Age group	Pillai's Trace	0.042	0.958	25	2825	0.523	0.008
	Wilks' Lambda	0.959	0.956	25	2085.524	0.525	0.008
	Hotelling's Trace	0.043	0.954	25	2797	0.528	0.008
	Roy's Largest Root	0.022	2.436c	5	565	0.034	0.021
Situation * Driver Cyclist * gender	Pillai's Trace	0.005	.534b	5	561	0.75	0.005
	Wilks' Lambda	0.995	.534b	5	561	0.75	0.005
	Hotelling's Trace	0.005	.534b	5	561	0.75	0.005
	Roy's Largest Root	0.005	.534b	5	561	0.75	0.005
Situation * Age groups * gender	Pillai's Trace	0.048	1.098	25	2825	0.335	0.01
	Wilks' Lambda	0.953	1.095	25	2085.524	0.338	0.01

	Hotelling's Trace	0.049	1.092	25	2797	0.342	0.01
	Roy's Largest Root	0.021	2.328c	5	565	0.041	0.02
Situation * Driver Cyclist * Age group * gender	Pillai's Trace	0.051	1.174	25	2825	0.251	0.01
	Wilks' Lambda	0.949	1.174	25	2085.524	0.251	0.01
	Hotelling's Trace	0.052	1.174	25	2797	0.251	0.01
	Roy's Largest Root	0.028	3.192c	5	565	0.007	0.027
Configuration * Situation	Pillai's Trace	0.021	2.354b	5	561	0.039	0.021
	Wilks' Lambda	0.979	2.354b	5	561	0.039	0.021
	Hotelling's Trace	0.021	2.354b	5	561	0.039	0.021
	Roy's Largest Root	0.021	2.354b	5	561	0.039	0.021
Configuration * Situation * Control	Pillai's Trace	0.005	.547b	5	561	0.741	0.005
	Wilks' Lambda	0.995	.547b	5	561	0.741	0.005
	Hotelling's Trace	0.005	.547b	5	561	0.741	0.005
	Roy's Largest Root	0.005	.547b	5	561	0.741	0.005
Configuration * Situation * Overconfidence	Pillai's Trace	0.003	.373b	5	561	0.867	0.003
	Wilks' Lambda	0.997	.373b	5	561	0.867	0.003
	Hotelling's Trace	0.003	.373b	5	561	0.867	0.003
	Roy's Largest Root	0.003	.373b	5	561	0.867	0.003
Configuration * Situation * Incompetence	Pillai's Trace	0.025	2.831b	5	561	0.016	0.025
	Wilks' Lambda	0.975	2.831b	5	561	0.016	0.025
	Hotelling's Trace	0.025	2.831b	5	561	0.016	0.025
	Roy's Largest Root	0.025	2.831b	5	561	0.016	0.025
Configuration * Situation * Violation	Pillai's Trace	0.019	2.126b	5	561	0.061	0.019
	Wilks' Lambda	0.981	2.126b	5	561	0.061	0.019
	Hotelling's Trace	0.019	2.126b	5	561	0.061	0.019
	Roy's Largest Root	0.019	2.126b	5	561	0.061	0.019
Configuration * Situation * weekly time	Pillai's Trace	0.02	2.279b	5	561	0.046	0.02
	Wilks' Lambda	0.98	2.279b	5	561	0.046	0.02
	Hotelling's Trace	0.02	2.279b	5	561	0.046	0.02
	Roy's Largest Root	0.02	2.279b	5	561	0.046	0.02
Configuration * Situation * monthly use	Pillai's Trace	0.011	1.211b	5	561	0.302	0.011
	Wilks' Lambda	0.989	1.211b	5	561	0.302	0.011
	Hotelling's Trace	0.011	1.211b	5	561	0.302	0.011
	Roy's Largest Root	0.011	1.211b	5	561	0.302	0.011
Configuration * Situation * Driver Cyclist	Pillai's Trace	0.063	7.516b	5	561	.000	0.063
	Wilks' Lambda	0.937	7.516b	5	561	.000	0.063
	Hotelling's Trace	0.067	7.516b	5	561	.000	0.063

	Roy's Largest Root	0.067	7.516b	5	561	.000	0.063
Configuration * Situation * Age group	Pillai's Trace	0.06	1.362	25	2825	0.108	0.012
	Wilks' Lambda	0.942	1.361	25	2085.524	0.109	0.012
	Hotelling's Trace	0.061	1.358	25	2797	0.111	0.012
	Roy's Largest Root	0.023	2.644c	5	565	0.022	0.023
Configurations' * Situation * gender	Pillai's Trace	0.018	2.076b	5	561	0.067	0.018
	Wilks' Lambda	0.982	2.076b	5	561	0.067	0.018
	Hotelling's Trace	0.019	2.076b	5	561	0.067	0.018
	Roy's Largest Root	0.019	2.076b	5	561	0.067	0.018
Configuration * Situation * Driver Cyclist * Age group	Pillai's Trace	0.059	1.346	25	2825	0.117	0.012
	Wilks' Lambda	0.942	1.346	25	2085.524	0.117	0.012
	Hotelling's Trace	0.06	1.345	25	2797	0.117	0.012
	Roy's Largest Root	0.028	3.172c	5	565	0.008	0.027
Configuration * Situation * Driver Cyclist * gender	Pillai's Trace	0.001	.138b	5	561	0.983	0.001
	Wilks' Lambda	0.999	.138b	5	561	0.983	0.001
	Hotelling's Trace	0.001	.138b	5	561	0.983	0.001
	Roy's Largest Root	0.001	.138b	5	561	0.983	0.001
Configuration * Situation * Age group * gender	Pillai's Trace	0.027	0.62	25	2825	0.929	0.005
	Wilks' Lambda	0.973	0.617	25	2085.524	0.93	0.005
	Hotelling's Trace	0.027	0.615	25	2797	0.931	0.005
	Roy's Largest Root	0.012	1.383c	5	565	0.229	0.012
Configuration * Situation * Driver Cyclist * Age group * gender	Pillai's Trace	0.031	0.703	25	2825	0.86	0.006
	Wilks' Lambda	0.969	0.702	25	2085.524	0.86	0.006
	Hotelling's Trace	0.031	0.703	25	2797	0.859	0.006
	Roy's Largest Root	0.022	2.513c	5	565	0.029	0.022

a Design: Intercept + Control + Overconfidence+ Incompetence+ Violation+ weekly time+monthly use + Driver Cyclist + Age group + gender + Driver Cyclist * Age group + Driver Cyclist * gender + Age group * gender+ Driver Cyclist * Age group * gender

b Exact statistic

Table C4 Mauchly’s Test of Sphericity

Mauchly’s Test of Sphericitya
Measure: MEASURE_1

Within Subjects Effect	Mauchly’s W	Approx. Chi-Square	df	Sig.	Epsilonb	
					Greenhouse-Geisser	Huynh-Feldt
Configuration	1.000	.000	0	.	1.000	1.000
Situation	0.771	146.647	14	.000	0.913	0.969
Configuration * Situation	0.811	118.216	14	.000	0.92	0.976

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.
a Design: Intercept + Control + Overconfidence + Incompetence + Violation + Weekly time + Monthly use + Driver Cyclist + Age groups + Gender + Driver Cyclist * Age group + Driver Cyclist * Gender+ Age group * Gender + Driver Cyclist * Age group * Gender
Within Subjects Design: Configuration + Situation + Configuration * Situation
b May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Table C5 Tests of Within-Subjects Effects

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Configuration (Cyclist Driver)	Sphericity Assumed	0.103	1	0.103	0.094	0.759
	Greenhouse-Geisser	0.103	1	0.103	0.094	0.759
	Huynh-Feldt	0.103	1	0.103	0.094	0.759
	Lower-bound	0.103	1	0.103	0.094	0.759
Configuration * Control	Sphericity Assumed	0.564	1	0.564	0.516	0.473
	Greenhouse-Geisser	0.564	1	0.564	0.516	0.473
	Huynh-Feldt	0.564	1	0.564	0.516	0.473
	Lower-bound	0.564	1	0.564	0.516	0.473
Configuration* Overconfidence	Sphericity Assumed	11.039	1	11.039	10.104	0.002
	Greenhouse-Geisser	11.039	1	11.039	10.104	0.002
	Huynh-Feldt	11.039	1	11.039	10.104	0.002
	Lower-bound	11.039	1	11.039	10.104	0.002
Configuration* Incompetence	Sphericity Assumed	3.167	1	3.167	2.899	0.089
	Greenhouse-Geisser	3.167	1	3.167	2.899	0.089
	Huynh-Feldt	3.167	1	3.167	2.899	0.089
	Lower-bound	3.167	1	3.167	2.899	0.089
Configuration* Violation	Sphericity Assumed	0.135	1	0.135	0.123	0.726
	Greenhouse-Geisser	0.135	1	0.135	0.123	0.726
	Huynh-Feldt	0.135	1	0.135	0.123	0.726
	Lower-bound	0.135	1	0.135	0.123	0.726
Configuration* Weekly time	Sphericity Assumed	1.794	1	1.794	1.642	0.201
	Greenhouse-Geisser	1.794	1	1.794	1.642	0.201
	Huynh-Feldt	1.794	1	1.794	1.642	0.201
	Lower-bound	1.794	1	1.794	1.642	0.201
Configuration* Monthly use	Sphericity Assumed	0.722	1	0.722	0.661	0.417
	Greenhouse-Geisser	0.722	1	0.722	0.661	0.417
	Huynh-Feldt	0.722	1	0.722	0.661	0.417
	Lower-bound	0.722	1	0.722	0.661	0.417
Configuration* Driver Cyclist	Sphericity Assumed	19.672	1	19.672	18.006	.000
	Greenhouse-Geisser	19.672	1	19.672	18.006	.000
	Huynh-Feldt	19.672	1	19.672	18.006	.000
	Lower-bound	19.672	1	19.672	18.006	.000
Configuration* Age group	Sphericity Assumed	7.368	5	1.474	1.349	0.242
	Greenhouse-Geisser	7.368	5	1.474	1.349	0.242
	Huynh-Feldt	7.368	5	1.474	1.349	0.242
	Lower-bound	7.368	5	1.474	1.349	0.242
Configuration* Gender	Sphericity Assumed	0	1	0	0	0.989

	Greenhouse-Geisser	0	1	0	0	0.989
	Huynh-Feldt	0	1	0	0	0.989
	Lower-bound	0	1	0	0	0.989
Configuration* Driver Cyclist * Age group	Sphericity Assumed	8.044	5	1.609	1.473	0.197
	Greenhouse-Geisser	8.044	5	1.609	1.473	0.197
	Huynh-Feldt	8.044	5	1.609	1.473	0.197
	Lower-bound	8.044	5	1.609	1.473	0.197
Configuration* Driver Cyclist * gender	Sphericity Assumed	2.58	1	2.58	2.362	0.125
	Greenhouse-Geisser	2.58	1	2.58	2.362	0.125
	Huynh-Feldt	2.58	1	2.58	2.362	0.125
	Lower-bound	2.58	1	2.58	2.362	0.125
Configuration* Age group * Gender	Sphericity Assumed	2.81	5	0.562	0.514	0.765
	Greenhouse-Geisser	2.81	5	0.562	0.514	0.765
	Huynh-Feldt	2.81	5	0.562	0.514	0.765
	Lower-bound	2.81	5	0.562	0.514	0.765
Configuration * Driver Cyclist * Age group * Gender	Sphericity Assumed	7.058	5	1.412	1.292	0.266
	Greenhouse-Geisser	7.058	5	1.412	1.292	0.266
	Huynh-Feldt	7.058	5	1.412	1.292	0.266
	Lower-bound	7.058	5	1.412	1.292	0.266
Error (Configuration)	Sphericity Assumed	617.271	565	1.093		
	Greenhouse-Geisser	617.271	565	1.093		
	Huynh-Feldt	617.271	565	1.093		
	Lower-bound	617.271	565	1.093		
Situation	Sphericity Assumed	6.573	5	1.315	1.365	0.234
	Greenhouse-Geisser	6.573	4.566	1.44	1.365	0.238
	Huynh-Feldt	6.573	4.844	1.357	1.365	0.236
	Lower-bound	6.573	1	6.573	1.365	0.243
Situation * Control	Sphericity Assumed	4.263	5	0.853	0.885	0.49
	Greenhouse-Geisser	4.263	4.566	0.933	0.885	0.483
	Huynh-Feldt	4.263	4.844	0.88	0.885	0.487
	Lower-bound	4.263	1	4.263	0.885	0.347
Situation * Overconfidence	Sphericity Assumed	9.545	5	1.909	1.983	0.078
	Greenhouse-Geisser	9.545	4.566	2.09	1.983	0.085
	Huynh-Feldt	9.545	4.844	1.97	1.983	0.08
	Lower-bound	9.545	1	9.545	1.983	0.16
Situation * Incompetence	Sphericity Assumed	1.479	5	0.296	0.307	0.909
	Greenhouse-Geisser	1.479	4.566	0.324	0.307	0.895
	Huynh-Feldt	1.479	4.844	0.305	0.307	0.904
	Lower-bound	1.479	1	1.479	0.307	0.58
Situation * Violation	Sphericity Assumed	3.316	5	0.663	0.689	0.632
	Greenhouse-Geisser	3.316	4.566	0.726	0.689	0.619
	Huynh-Feldt	3.316	4.844	0.684	0.689	0.627

	Lower-bound	3.316	1	3.316	0.689	0.407
Situation * Weekly time	Sphericity Assumed	2.497	5	0.499	0.519	0.762
	Greenhouse-Geisser	2.497	4.566	0.547	0.519	0.746
	Huynh-Feldt	2.497	4.844	0.515	0.519	0.757
	Lower-bound	2.497	1	2.497	0.519	0.472
Situation * Monthly use	Sphericity Assumed	4.708	5	0.942	0.978	0.43
	Greenhouse-Geisser	4.708	4.566	1.031	0.978	0.425
	Huynh-Feldt	4.708	4.844	0.972	0.978	0.428
	Lower-bound	4.708	1	4.708	0.978	0.323
Situation * Driver Cyclist	Sphericity Assumed	22.446	5	4.489	4.663	.000
	Greenhouse-Geisser	22.446	4.566	4.916	4.663	.000
	Huynh-Feldt	22.446	4.844	4.633	4.663	.000
	Lower-bound	22.446	1	22.446	4.663	0.031
Situation * Age group	Sphericity Assumed	29.726	25	1.189	1.235	0.195
	Greenhouse-Geisser	29.726	22.832	1.302	1.235	0.203
	Huynh-Feldt	29.726	24.222	1.227	1.235	0.198
	Lower-bound	29.726	5	5.945	1.235	0.291
Situation * Gender	Sphericity Assumed	3.594	5	0.719	0.747	0.589
	Greenhouse-Geisser	3.594	4.566	0.787	0.747	0.577
	Huynh-Feldt	3.594	4.844	0.742	0.747	0.585
	Lower-bound	3.594	1	3.594	0.747	0.388
Situation * Driver Cyclist * Age group	Sphericity Assumed	20.147	25	0.806	0.837	0.696
	Greenhouse-Geisser	20.147	22.832	0.882	0.837	0.685
	Huynh-Feldt	20.147	24.222	0.832	0.837	0.692
	Lower-bound	20.147	5	4.029	0.837	0.524
Situation * Driver Cyclist * Gender	Sphericity Assumed	2.652	5	0.53	0.551	0.738
	Greenhouse-Geisser	2.652	4.566	0.581	0.551	0.722
	Huynh-Feldt	2.652	4.844	0.548	0.551	0.732
	Lower-bound	2.652	1	2.652	0.551	0.458
Situation * Age group * Gender	Sphericity Assumed	26.023	25	1.041	1.081	0.355
	Greenhouse-Geisser	26.023	22.832	1.14	1.081	0.358
	Huynh-Feldt	26.023	24.222	1.074	1.081	0.357
	Lower-bound	26.023	5	5.205	1.081	0.37
Situation * Driver Cyclist * Age group * Gender	Sphericity Assumed	25.152	25	1.006	1.045	0.402
	Greenhouse-Geisser	25.152	22.832	1.102	1.045	0.403
	Huynh-Feldt	25.152	24.222	1.038	1.045	0.402
	Lower-bound	25.152	5	5.03	1.045	0.39
Error(Situation)	Sphericity Assumed	2719.964	2825	0.963		
	Greenhouse-Geisser	2719.964	2579.974	1.054		
	Huynh-Feldt	2719.964	2737.085	0.994		
	Lower-bound	2719.964	565	4.814		
Configuration*	Sphericity Assumed	4.405	5	0.881	2.397	0.035

Situation						
	Greenhouse-Geisser	4.405	4.601	0.957	2.397	0.04
	Huynh-Feldt	4.405	4.882	0.902	2.397	0.037
	Lower-bound	4.405	1	4.405	2.397	0.122
Configuration* Situation * Control	Sphericity Assumed	0.957	5	0.191	0.521	0.761
	Greenhouse-Geisser	0.957	4.601	0.208	0.521	0.746
	Huynh-Feldt	0.957	4.882	0.196	0.521	0.757
	Lower-bound	0.957	1	0.957	0.521	0.471
Configurations’* Situation * Overconfidence	Sphericity Assumed	0.858	5	0.172	0.467	0.801
	Greenhouse-Geisser	0.858	4.601	0.187	0.467	0.786
	Huynh-Feldt	0.858	4.882	0.176	0.467	0.797
	Lower-bound	0.858	1	0.858	0.467	0.495
Configuration* Situation * Incompetence	Sphericity Assumed	5.955	5	1.191	3.24	0.006
	Greenhouse-Geisser	5.955	4.601	1.294	3.24	0.008
	Huynh-Feldt	5.955	4.882	1.22	3.24	0.007
	Lower-bound	5.955	1	5.955	3.24	0.072
Configurations’* Situation * Violation	Sphericity Assumed	3.794	5	0.759	2.064	0.067
	Greenhouse-Geisser	3.794	4.601	0.825	2.064	0.073
	Huynh-Feldt	3.794	4.882	0.777	2.064	0.069
	Lower-bound	3.794	1	3.794	2.064	0.151
Configuration* Situation *Weeklyuse	Sphericity Assumed	3.975	5	0.795	2.163	0.055
	Greenhouse-Geisser	3.975	4.601	0.864	2.163	0.061
	Huynh-Feldt	3.975	4.882	0.814	2.163	0.057
	Lower-bound	3.975	1	3.975	2.163	0.142
Configuration* Situation *Monthly use	Sphericity Assumed	1.917	5	0.383	1.043	0.39
	Greenhouse-Geisser	1.917	4.601	0.417	1.043	0.388
	Huynh-Feldt	1.917	4.882	0.393	1.043	0.39
	Lower-bound	1.917	1	1.917	1.043	0.308
Configuration* Situation * Driver Cyclist	Sphericity Assumed	16.916	5	3.383	9.205	.000
	Greenhouse-Geisser	16.916	4.601	3.676	9.205	.000
	Huynh-Feldt	16.916	4.882	3.465	9.205	.000
	Lower-bound	16.916	1	16.916	9.205	0.003
Configuration* Situation * Age groups	Sphericity Assumed	12.997	25	0.52	1.415	0.083
	Greenhouse-Geisser	12.997	23.006	0.565	1.415	0.091
	Huynh-Feldt	12.997	24.408	0.533	1.415	0.085
	Lower-bound	12.997	5	2.599	1.415	0.217
Configuration* Situation * Gender	Sphericity Assumed	4.687	5	0.937	2.551	0.026
	Greenhouse-Geisser	4.687	4.601	1.019	2.551	0.030
	Huynh-Feldt	4.687	4.882	0.96	2.551	0.027

	Lower-bound	4.687	1	4.687	2.551	0.111
Configuration* Situation * Driver Cyclist * Age group	Sphericity Assumed	11.514	25	0.461	1.253	0.18
	Greenhouse-Geisser	11.514	23.006	0.5	1.253	0.188
	Huynh-Feldt	11.514	24.408	0.472	1.253	0.182
	Lower-bound	11.514	5	2.303	1.253	0.283
Configuration* Situation * Driver Cyclist * Gender	Sphericity Assumed	0.274	5	0.055	0.149	0.98
	Greenhouse-Geisser	0.274	4.601	0.06	0.149	0.975
	Huynh-Feldt	0.274	4.882	0.056	0.149	0.979
	Lower-bound	0.274	1	0.274	0.149	0.699
Configuration* Situation * Age groups * Gender	Sphericity Assumed	6.052	25	0.242	0.659	0.9
	Greenhouse-Geisser	6.052	23.006	0.263	0.659	0.889
	Huynh-Feldt	6.052	24.408	0.248	0.659	0.897
	Lower-bound	6.052	5	1.21	0.659	0.655
Configuration* Situation * Driver Cyclist * Age groups * gender	Sphericity Assumed	5.852	25	0.234	0.637	0.916
	Greenhouse-Geisser	5.852	23.006	0.254	0.637	0.906
	Huynh-Feldt	5.852	24.408	0.24	0.637	0.914
	Lower-bound	5.852	5	1.17	0.637	0.672
Error Configuration* Situation	Sphericity Assumed	1038.282	2825	0.368		
	Greenhouse-Geisser	1038.282	2599.648	0.399		
	Huynh-Feldt	1038.282	2758.144	0.376		
	Lower-bound	1038.282	565	1.838		

Table C6 Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Configuration C.D	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squar-ed
Configuration (cyclist or driver)	Linear	0.103	1	0.103	0.094	0.759	.000
Configuration * Control	Linear	0.564	1	0.564	0.516	0.473	.001
Configuration * Overconfidence	Linear	11.039	1	11.039	10.104	0.002	.018
Configuration * Incompetence	Linear	3.167	1	3.167	2.899	0.089	.005
Configuration * Violation	Linear	0.135	1	0.135	0.123	0.726	.001
Configuration * Weekly use	Linear	1.794	1	1.794	1.642	0.201	.003
Configuration * Monthly use	Linear	0.722	1	0.722	0.661	0.417	.000
Configuration * Driver Cyclist	Linear	19.672	1	19.672	18.006	.000	.000
Configuration * Age group	Linear	7.368	5	1.474	1.349	0.242	.031
Configuration * Gender	Linear	0	1	0	0	0.989	.012
Configuration * Driver Cyclist * Age group	Linear	8.044	5	1.609	1.473	0.197	.004
Configuration * Driver Cyclist * Gender	Linear	2.58	1	2.58	2.362	0.125	.005
Configuration * Age group * Gender	Linear	2.81	5	0.562	0.514	0.765	.013
Configuration * Driver Cyclist * Age group * gender	Linear	7.058	5	1.412	1.292	0.266	.011
Error (Configuration)	Linear	617.271	565	1.093			
Situation	Linear	3.015	1	3.015	2.312	0.129	.004
	Quadratic	2.52	1	2.52	2.718	0.100	.005
	Cubic	0.596	1	0.596	0.827	0.364	.001
	Order 4	0.314	1	0.314	0.372	0.542	.001
	Order 5	0.128	1	0.128	0.125	0.723	.000
Situation * Control	Linear	0.086	1	0.086	0.066	0.797	0
	Quadratic	3.946	1	3.946	4.258	0.04	0.007
	Cubic	0.144	1	0.144	0.199	0.656	0
	Order 4	0.084	1	0.084	0.099	0.753	0
	Order 5	0.003	1	0.003	0.003	0.957	0
Situation * Overconfidence	Linear	0.53	1	0.53	0.407	0.524	0.001
	Quadratic	1.862	1	1.862	2.008	0.157	0.004
	Cubic	3.78E-06	1	3.78E-06	0	0.998	0
	Order 4	7.088	1	7.088	8.397	0.004	0.015
	Order 5	0.065	1	0.065	0.064	0.800	0
Situation *Incompetence	Linear	0.87	1	0.87	0.667	0.415	0.001
	Quadratic	2.29E-05	1	2.29E-05	0	0.996	0
	Cubic	0.22	1	0.22	0.305	0.581	0.001
	Order 4	0.188	1	0.188	0.222	0.637	0
	Order 5	0.202	1	0.202	0.198	0.656	0
Situation * Violation	Linear	0.408	1	0.408	0.312	0.576	0.001
	Quadratic	0.901	1	0.901	0.972	0.325	0.002
	Cubic	0.356	1	0.356	0.493	0.483	0.001
	Order 4	0.802	1	0.802	0.95	0.33	0.002

	Order 5	0.85	1	0.85	0.836	0.361	0.001
Situation * Weekly use	Linear	0.653	1	0.653	0.5	0.480	0.001
	Quadratic	0.148	1	0.148	0.159	0.690	0
	Cubic	1.002	1	1.002	1.388	0.239	0.002
	Order 4	0.203	1	0.203	0.241	0.624	0
	Order 5	0.491	1	0.491	0.483	0.487	0.001
Situation * Monthly use	Linear	0.304	1	0.304	0.233	0.629	0
	Quadratic	1.21	1	1.21	1.305	0.254	0.002
	Cubic	0.608	1	0.608	0.843	0.359	0.001
	Order 4	1.913	1	1.913	2.267	0.133	0.004
	Order 5	0.673	1	0.673	0.661	0.417	0.001
Situation * Driver Cyclist	Linear	7.077	1	7.077	5.427	0.020	0.01
	Quadratic	0.059	1	0.059	0.064	0.801	0
	Cubic	0.355	1	0.355	0.492	0.483	0.001
	Order 4	3.867	1	3.867	4.581	0.033	0.008
	Order 5	11.088	1	11.088	10.899	0.001	0.019
Situation * Age groups	Linear	3.837	5	0.767	0.588	0.709	0.005
	Quadratic	8.593	5	1.719	1.854	0.101	0.016
	Cubic	5.872	5	1.174	1.628	0.151	0.014
	Order 4	8.661	5	1.732	2.052	0.07	0.018
	Order 5	2.763	5	0.553	0.543	0.744	0.005
Situation * Gender	Linear	0.505	1	0.505	0.387	0.534	0.001
	Quadratic	2.345	1	2.345	2.53	0.112	0.004
	Cubic	0.206	1	0.206	0.285	0.594	0.001
	Order 4	0.078	1	0.078	0.092	0.761	0
	Order 5	0.46	1	0.46	0.453	0.501	0.001
Situation * Driver Cyclist * Age group	Linear	3.089	5	0.618	0.474	0.796	0.004
	Quadratic	3.896	5	0.779	0.841	0.521	0.007
	Cubic	5.182	5	1.036	1.437	0.209	0.013
	Order 4	5.176	5	1.035	1.226	0.295	0.011
	Order 5	2.804	5	0.561	0.551	0.737	0.005
Situation * Driver Cyclist * gender Cyclist Driver	Linear	1.268	1	1.268	0.972	0.325	0.002
	Quadratic	0.083	1	0.083	0.09	0.765	0
	Cubic	0.875	1	0.875	1.212	0.271	0.002
	Order 4	0.082	1	0.082	0.097	0.756	0
	Order 5	0.345	1	0.345	0.339	0.561	0.001
Situation * Age group * Gender	Linear	3.898	5	0.78	0.598	0.702	0.005
	Quadratic	6.953	5	1.391	1.5	0.188	0.013
	Cubic	6.401	5	1.28	1.774	0.116	0.015
	Order 4	4.783	5	0.957	1.133	0.341	0.01
	Order 5	3.988	5	0.798	0.784	0.561	0.007
Situation * Driver Cyclist * Age group * Gender	Linear	6.23	5	1.246	0.955	0.445	0.008
	Quadratic	9.882	5	1.976	2.132	0.060	0.019
	Cubic	2.632	5	0.526	0.73	0.601	0.006

	Order 4	4.32	5	0.864	1.024	0.403	0.009
	Order 5	2.089	5	0.418	0.411	0.842	0.004
Error(Situation)	Linear	736.87	565	1.304			
	Quadratic	523.697	565	0.927			
	Cubic	407.654	565	0.722			
	Order 4	476.921	565	0.844			
	Order 5	574.821	565	1.017			
Configuration * Situation	Linear	1.825	1	1.825	3.959	0.047	0.007
	Quadratic	1.427	1	1.427	3.92	0.048	0.007
	Cubic	0.16	1	0.16	0.518	0.472	0.001
	Order 4	0.927	1	0.927	2.878	0.09	0.005
	Order 5	0.065	1	0.065	0.171	0.680	0
Configuration * Situation * Control	Linear	0.075	1	0.075	0.162	0.687	0
	Quadratic	0.255	1	0.255	0.7	0.403	0.001
	Cubic	0.229	1	0.229	0.742	0.389	0.001
	Order 4	0.173	1	0.173	0.536	0.464	0.001
	Order 5	0.225	1	0.225	0.591	0.442	0.001
Configuration * Situation * Overconfidence	Linear	0.284	1	0.284	0.615	0.433	0.001
	Quadratic	0.01	1	0.01	0.027	0.869	0
	Cubic	0.036	1	0.036	0.117	0.733	0
	Order 4	0.149	1	0.149	0.461	0.497	0.001
	Order 5	0.38	1	0.38	0.998	0.318	0.002
Configuration * Situation * Incompetence	Linear	3.536	1	3.536	7.669	0.006	0.013
	Quadratic	1.783	1	1.783	4.897	0.027	0.009
	Cubic	0.127	1	0.127	0.412	0.521	0.001
	Order 4	0.369	1	0.369	1.146	0.285	0.002
	Order 5	0.139	1	0.139	0.364	0.546	0.001
Configuration * Situation * Violation	Linear	0.21	1	0.21	0.456	0.500	0.001
	Quadratic	1.037	1	1.037	2.847	0.092	0.005
	Cubic	0.014	1	0.014	0.044	0.834	0
	Order 4	0.007	1	0.007	0.021	0.886	0
	Order 5	2.527	1	2.527	6.636	0.010	0.012
Configuration * Situation * Weekly time	Linear	0.129	1	0.129	0.28	0.597	0
	Quadratic	0.778	1	0.778	2.137	0.144	0.004
	Cubic	0.449	1	0.449	1.45	0.229	0.003
	Order 4	0.378	1	0.378	1.174	0.279	0.002
	Order 5	2.24	1	2.24	5.884	0.016	0.01
Configuration * Situation * Monthly use	Linear	0.003	1	0.003	0.006	0.940	0
	Quadratic	0.08	1	0.08	0.219	0.640	0
	Cubic	0.331	1	0.331	1.068	0.302	0.002
	Order 4	0.673	1	0.673	2.089	0.149	0.004
	Order 5	0.831	1	0.831	2.182	0.14	0.004
Configuration * Situation * Driver Cyclist	Linear	10.069	1	10.069	21.837	.000	0.037
	Quadratic	6.052	1	6.052	16.617	.000	0.029

	Cubic	0.237	1	0.237	0.765	0.382	0.001
	Order 4	0.488	1	0.488	1.514	0.219	0.003
	Order 5	0.071	1	0.071	0.187	0.666	0
Configuration * Situation * Age group	Linear	3.267	5	0.653	1.417	0.216	0.012
	Quadratic	3.418	5	0.684	1.877	0.096	0.016
	Cubic	1.387	5	0.277	0.896	0.483	0.008
	Order 4	2.187	5	0.437	1.358	0.239	0.012
	Order 5	2.738	5	0.548	1.438	0.209	0.013
Configuration * Situation * Gender	Linear	0.411	1	0.411	0.892	0.345	0.002
	Quadratic	2.665	1	2.665	7.318	0.007	0.013
	Cubic	0.181	1	0.181	0.584	0.445	0.001
	Order 4	0.674	1	0.674	2.09	0.149	0.004
	Order 5	0.757	1	0.757	1.989	0.159	0.004
Configuration * Situation * Driver Cyclist * Age group	Linear	0.714	5	0.143	0.31	0.907	0.003
	Quadratic	3.913	5	0.783	2.149	0.058	0.019
	Cubic	2.855	5	0.571	1.845	0.102	0.016
	Order 4	1.085	5	0.217	0.673	0.644	0.006
	Order 5	2.948	5	0.59	1.549	0.173	0.014
Configuration * Situation * Driver Cyclist * Gender	Linear	0.041	1	0.041	0.09	0.764	0
	Quadratic	0.007	1	0.007	0.018	0.893	0
	Cubic	0.01	1	0.01	0.034	0.854	0
	Order 4	0.048	1	0.048	0.149	0.699	0
	Order 5	0.168	1	0.168	0.44	0.507	0.001
Configuration * Situation * Age group * Gender	Linear	1.895	5	0.379	0.822	0.534	0.007
	Quadratic	1.214	5	0.243	0.667	0.649	0.006
	Cubic	1.593	5	0.319	1.03	0.399	0.009
	Order 4	0.203	5	0.041	0.126	0.987	0.001
	Order 5	1.146	5	0.229	0.602	0.698	0.005
Configuration * Situation * Driver Cyclist * Age groups * gender	Linear	2.68	5	0.536	1.163	0.326	0.01
	Quadratic	1.462	5	0.292	0.803	0.548	0.007
	Cubic	0.525	5	0.105	0.339	0.889	0.003
	Order 4	0.582	5	0.116	0.361	0.875	0.003
	Order 5	0.603	5	0.121	0.317	0.903	0.003
Error (Configuration*Situation)	Linear	260.508	565	0.461			
	Quadratic	205.758	565	0.364			
	Cubic	174.82	565	0.309			
	Order 4	182.085	565	0.322			

Table C7 Levene’s Test of Equality of Error Variances

Levene’s Test of Equality of Error Variances

	F	df1	df2	Sig.
Cyclist Failing to yield	1.170	23	571	.266
Cyclist Going through a red light	1.834	23	571	0.011
Cyclist Not signalling when turning	1.229	23	571	0.212
Cyclist Swerving	1.381	23	571	0.112
Cyclist Tailgating	2.009	23	571	0.004
Cyclist Not checking traffic	2.582	23	571	.000
Driver Failing to yield	2.493	23	571	.000
Driver Going through a red light	2.826	23	571	.000
Driver Not signalling when turning	1.221	23	571	0.219
Driver Swerving	1.569	23	571	0.045
Driver Tailgating	1.803	23	571	0.013
Driver Not checking traffic	3.102	23	571	.000

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.
a Design: Intercept + Control+ Overconfidence + Incompetence + Violation + weekely time + monthly use + DriverCyclist + Agegroup+ gender + DriverCyclist * Agegroups + DriverCyclist * gender + Agegroups * gender + DriverCyclist * Agegroup * gender
Within Subjects Design: Configurations’ + Situation + Configurations’ * Situation

Table C8 Tests of Between-Subjects Effects

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squar-ed
Intercept	602.342	1	602.342	98.795	.000	0.149
Control	40.021	1	40.021	6.564	0.011	0.011
Overconfidence	18.502	1	18.502	3.035	0.082	0.005
Incompetence	81.139	1	81.139	13.308	.000	0.023
Violation	30.432	1	30.432	4.991	0.026	0.009
Weekly time	28.594	1	28.594	4.69	0.031	0.008
Monthly use	22.436	1	22.436	3.68	0.056	0.006
DriverCyclist	30.496	1	30.496	5.002	0.026	0.009
Agegroup	77.834	5	15.567	2.553	0.027	0.022
gender	33.928	1	33.928	5.565	0.019	0.010
DriverCyclist * Agegroups	47.472	5	9.494	1.557	0.170	0.014
DriverCyclist * gender	0.291	1	0.291	0.048	0.827	.000
Agegroup * gender	27.907	5	5.581	0.915	0.470	0.008
DriverCyclist * Agegroup * gender	18.79	5	3.758	0.616	0.687	0.005
Error	3444.756		565	6.097		

Grand Mean

Measure: MEASURE_1

95% Confidence Interval

Lower Bound 3.134 Upperbound 3.349

Mean 3.241a Std error .055
a Covariates appearing in the model are evaluated at the following values:
Control = 3.72, Overconfidence = 3.66, Incompetence= 2.02, violation = 1.6350,
weekly time = 3.68, monthly use = 5.44.

Table C9 Test of significance levels for within-subjects comparisons in ANOVAs conducted separately for each Situation. Cyclist and driver Failing to yield

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Configuration	Linear	3.989	1	3.989	6.818	.009
Configuration * Overconfidence	Linear	2.703	1	2.703	4.621	.032
Configuration * Control	Linear	.947	1	.947	1.618	.204
Configuration * Incompetence	Linear	8.190	1	8.190	13.998	.000
Configuration * Weekly time	Linear	.021	1	.021	.037	.848
Configuration * Violation	Linear	.824	1	.824	1.408	.236
Configuration * Monthly use	Linear	.820	1	.820	1.401	.237
Configuration * Age group	Linear	3.544	5	.709	1.211	.302
Configuration * Driver Cyclist	Linear	28.308	1	28.308	48.384	.000
Configuration * gender	Linear	.819	1	.819	1.399	.237
Configuration * Age group * Driver Cyclist	Linear	.718	5	.144	.245	.942
Configuration * Age group * gender	Linear	1.053	5	.211	.360	.876
Configuration * Driver Cyclist * gender	Linear	.491	1	.491	.839	.360
Configuration * Age group * Driver Cyclist * gender	Linear	2.278	5	.456	.779	.565
Error(Configuration)	Linear	329.983	564	.585		

Table C10 Correlations – a cyclist fails to give way

Descriptive Statistics	Mean	Std. Deviation
Cyclist or driver	1.25	0.436
Age group	4.09	1.229
Gender	1.61	0.489
Weekly time	3.68	1.069
Monthly use	5.44	1.555
Violation scale	1.635	0.41829
Control	3.72	0.577
Overconfidence	3.66	0.616
Incompetence	2.02	0.509
A Cyclist fails to give way to you	2.5496	1.15418

Correlations	Cyclist or driver	Age group	Gender	Time per week	Month-ly use	Viola-tion	Control	Over-confid-ence	Incomp -etence
Cyclist or driver	1	.095*	-.279**	-.193**	.311**	-0.041	-.123**	-.220**	.200**
		0.020	.000	.000	.000	0.324	0.003	.000	.000
Age group		1	0.043	0.065	0.008	-.134**	-0.01	-0.044	0.025
			0.296	0.111	0.846	0.001	0.812	0.282	0.551
Gender			1	.167**	0.038	.096*	.183**	.238**	-.190**
				.000	0.352	0.019	.000	.000	.000
Time per week				1	.219**	-0.024	.228**	.260**	-.133**
					.000	0.565	.000	.000	0.001
Monthly use					1	.110**	0.063	.111**	-0.041
						0.007	0.123	0.007	0.32
Violation						1	-.120**	-0.061	.307**
							0.003	0.14	.000
Control							1	.669**	-.361**
								.000	.000
Over confidence								1	-.380**
									.000
Incomp-etence									1
A cyclist fails to give way	.248**	-0.013	-.158**	-0.027	0.015	-0.056	-.174**	-.183**	.256**
	.000	0.758	.000	0.513	0.716	0.175	.000	.000	.000

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table C11 Correlations – a driver fails to give way

N 595	Mean	Std. Deviation
Cyclist or driver	1.25	0.436
Age group	4.09	1.229
Gender	1.61	0.489
Time per week	3.68	1.069
Monthly use	5.44	1.555
Frequency of	1.635	0.41829
Control	3.72	0.577
Overconfidence	3.66	0.616
Incompetence	2.02	0.509
A driver fails to give way to	3.6605	1.08667

Correlations	Cyclist or driver	Age group	Gender	Week-ly time	Month-ly use	Viola-tion	Control	Over-confid-ence	Incomp-etence
Cyclist or driver	1	.095*	-.279**	-.193**	.311**	-0.041	-.123**	-.220**	.200**
	Sig. (2-tailed)	0.02	.000	.000	.000	0.324	0.003	.000	.000
Age group		1	0.043	0.065	0.008	-.134**	-0.01	-0.044	0.025
			0.296	0.111	0.846	0.001	0.812	0.282	0.551
gender			1	.167**	0.038	.096*	.183**	.238**	-.190**
				.000	0.352	0.019	.000	.000	.000
Time per week				1	.219**	-0.024	.228**	.260**	-.133**
					.000	0.565	.000	.000	0.001
Monthly use					1	.110**	0.063	.111**	-0.041
						0.007	0.123	0.007	0.32
Violation scale						1	-.120**	-0.061	.307**
							0.003	0.14	.000
Control							1	.669**	-.361**
								.000	.000
Overconfidence								1	-.380**
									.000
Incompetence									1
A car driver fails to give way	-.301**	-.113**	0.023	.092*	-.160**	-0.024	-0.047	0.073	-0.022
	.000	0.006	0.578	0.026	.000	0.564	0.249	0.076	0.587

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table C12 Test of significance levels for within-subjects comparisons in ANOVAs conducted separately for each Situation. Cyclist and driver Going through a red light

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Configuration	Linear	.025	1	.025	.040	.841
Configuration * Overconfidence	Linear	3.370	1	3.370	5.406	.020
Configuration * Control	Linear	.000	1	.000	.000	.986
Configuration * Incompetence	Linear	.373	1	.373	.599	.439
Configuration * Weekly time	Linear	.087	1	.087	.140	.709
Configuration * Violations	Linear	.051	1	.051	.082	.775
Configuration * Monthly use	Linear	.015	1	.015	.024	.876
Configuration * Age group	Linear	5.152	5	1.030	1.653	.144
Configuration * Driver Cyclist	Linear	4.436	1	4.436	7.116	.008
Configuration * gender	Linear	1.017	1	1.017	1.632	.202
Configuration * Age groups * Driver Cyclist	Linear	4.327	5	.865	1.388	.227
Configuration * Age groups * gender	Linear	2.238	5	.448	.718	.610
Configuration * Driver Cyclist * gender	Linear	.877	1	.877	1.407	.236
Configuration * Age group * Driver Cyclist * gender	Linear	1.479	5	.296	.475	.795
Error(Configuration)	Linear	351.579	564	.623		

Table C13 Correlations – cyclist Going through a red light

n 595	Mean	Std. Deviation
Cyclist or driver	1.25	0.436
Age group	4.09	1.229
Gender	1.61	0.489
Time per week	3.68	1.069
Frequency of use total participants	5.44	1.555
Violation scale	1.635	0.41829
Control	3.72	0.577
Overconfidence	3.66	0.616
Incompetence	2.02	0.509
Cyclist Going through a red light	2.8807	1.20222

Correlations	Cyclist or driver	Age group	Gender	Weekly time	Monthly use	Viola-tion	Control	Over-confid-ence	Incomp-etence
Cyclist or driver	1	.095*	-.279**	-.193**	.311**	-0.041	-.123**	-.220**	.200**
		0.02	.000	.000	.000	0.324	0.003	.000	.000
Age group		1	0.043	0.065	0.008	-.134**	-0.01	-0.044	0.025
			0.296	0.111	0.846	0.001	0.812	0.282	0.551
Gender			1	.167**	0.038	.096*	.183**	.238**	-.190**
				.000	0.352	0.019	.000	.000	.000
Weekly time				1	.219**	-0.024	.228**	.260**	-.133**
					.000	0.565	.000	.000	0.001
Monthly use					1	.110**	0.063	.111**	-0.041
						0.007	0.123	0.007	0.32
Violation						1	-.120**	-0.061	.307**
							0.003	0.14	.000
Control							1	.669**	-.361**
								.000	.000
Over confidence								1	-.380**
									.000
Incompetence									1
Cyclist Going through a red light	.238**	-0.009	-.243**	-0.025	0.028	-0.053	-.136**	-.135**	.193**
	.000	0.834	.000	0.535	0.49	0.199	0.001	0.001	.000

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table C14 Correlations – driver Going through a red light

Descriptive Statistics n595	Mean	Std. Deviation
Cyclist or driver	1.25	0.436
Age group	4.09	1.229
Gender	1.61	0.489
Weekly time	3.68	1.069
Monthly use	5.44	1.555
Violation	1.635	0.41829
Control	3.72	0.577
Overconfidence	3.66	0.616
Incompetence	2.02	0.509
Driver Going through a red light	3.8605	1.1499

Correlations	Cyclist or driver	Age group	Gender	Weekly time	Month-ly use	Viola-tion	Control	Overconfid-ence	Incomp-etence
Cyclist or driver	1	.095*	-.279**	-.193**	.311**	-0.041	-.123**	-.220**	.200**
		0.02	.000	.000	.000	0.324	0.003	.000	.000
Age group		1	0.043	0.065	0.008	-.134**	-0.01	-0.044	0.025
			0.296	0.111	0.846	0.001	0.812	0.282	0.551
Gender			1	.167**	0.038	.096*	.183**	.238**	-.190**
				.000	0.352	0.019	.000	.000	.000
Weekly time				1	.219**	-0.024	.228**	.260**	-.133**
					.000	0.565	.000	.000	0.001
Monthly use					1	.110**	0.063	.111**	-0.041
						0.007	0.123	0.007	0.32
Violation						1	-.120**	-0.061	.307**
							0.003	0.14	.000
Control							1	.669**	-.361**
								.000	.000
Overconfidence								1	-.380**
									.000
Incompetence									1
Driver Going through a red light	-0.077	-.152**	-.170**	0.076	-0.034	-0.049	0.003	.081*	0.048
	0.06	.000	.000	0.063	0.407	0.228	0.949	0.047	0.247

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Table C15 Test of significance levels for within-subjects comparisons in ANOVAs conducted separately for each Situation. Cyclist and driver Not signalling when turning

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Configuration	Linear	.020	1	.020	.036	.849
Configuration * Overconfidence	Linear	.615	1	.615	1.126	.289
Configuration * Control	Linear	.027	1	.027	.050	.823
Configuration * Incompetence	Linear	.528	1	.528	.967	.326
Configuration * weekly time	Linear	.000	1	.000	.001	.978
Configuration * Violation	Linear	.577	1	.577	1.056	.304
Configuration * Monthly use	Linear	.041	1	.041	.075	.784
Configuration * Age group	Linear	3.114	5	.623	1.140	.338
Configuration * Driver Cyclist	Linear	1.137	1	1.137	2.081	.150
Configuration * gender	Linear	1.886	1	1.886	3.452	.064
Configuration * Age group * Driver Cyclist	Linear	7.278	5	1.456	2.664	.022
Configuration * Age group * gender	Linear	2.995	5	.599	1.097	.361
Configuration * Driver Cyclist * gender	Linear	.118	1	.118	.217	.642
Configuration * Age group * Driver Cyclist * gender	Linear	3.760	5	.752	1.377	.231
Error(Configuration)	Linear	308.108	564	.546		

Table C16 Correlations – cyclist Not signalling when turning

Descriptive Statistics	Mean	Std. Deviation
Cyclist or driver	1.25	0.436
Age group	4.09	1.229
Gender	1.61	0.489
Weekly time	3.68	1.069
Monthly use	5.44	1.555
Violation	1.635	0.41829
Control	3.72	0.577
Overconfidence	3.66	0.616
Incompetence	2.02	0.509
Cyclist Not signalling when turning	2.6437	1.05765

Correlations	Cyclist or driver	Age group	Gender	Week-ly time	Month-ly use	Viola-tion	Contro l	Over-confid-ence	Incom p-etence
Cyclist or driver	1	.095*	-.279**	-.193**	.311**	-0.041	-.123**	-.220**	.200**
		0.02	.000	.000	.000	0.324	0.003	.000	.000
Age grouped		1	0.043	0.065	0.008	-.134**	-0.01	-0.044	0.025
			0.296	0.111	0.846	0.001	0.812	0.282	0.551
Gender			1	.167**	0.038	.096*	.183**	.238**	-.190**
				.000	0.352	0.019	.000	.000	.000
Weekly time				1	.219**	-0.024	.228**	.260**	-.133**
					.000	0.565	.000	.000	0.001
Monthly use					1	.110**	0.063	.111**	-0.041
						0.007	0.123	0.007	0.32
Violation scale						1	-.120**	-0.061	.307**
							0.003	0.14	.000
Control							1	.669**	-.361**
								.000	.000
Overconfidence								1	-.380**
									.000
Incompetence									1
Cyclist Not signalling when turning	.113**	0.015	-.233**	-0.067	-.089*	-0.02	-.165**	-.187**	.219**
	0.006	0.723	.000	0.103	0.030	0.629	.000	.000	.000

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table C17 Correlations – driver Not signalling when turning

Descriptive Statistics	Mean	Std. Deviation
Cyclist or driver	1.25	0.436
Age group	4.09	1.229
Gender	1.61	0.489
Weekly time	3.68	1.069
Monthly use	5.44	1.555
Violation	1.635	0.41829
Control	3.72	0.577
Overconfidence	3.66	0.616
Incompetence	2.02	0.509
Driver Not signalling when turning	3.3227	1.0684

Correlations	Cyclist or driver	Age group	Gender	Week-ly time	Month -ly use	Viola-tion	Contro l	Over-confid-ence	Incom p-etence
Cyclist or driver	1	.095*	-.279**	-.193**	.311**	-0.041	-.123**	-.220**	.200**
		0.020	.000	.000	.000	0.324	0.003	.000	.000
Age grouped		1	0.043	0.065	0.008	-.134**	-0.01	-0.044	0.025
			0.296	0.111	0.846	0.001	0.812	0.282	0.551
Gender			1	.167**	0.038	.096*	.183**	.238**	-.190**
				.000	0.352	0.019	.000	.000	.000
Weekly time				1	.219**	-0.024	.228**	.260**	-.133**
					.000	0.565	.000	.000	0.001
Monthly use					1	.110**	0.063	.111**	-0.041
						0.007	0.123	0.007	0.32
Violation scale						1	-.120**	-0.061	.307**
							0.003	0.14	.000
Control							1	.669**	-.361**
								.000	.000
Overconfidence								1	-.380**
									.000
Incompetence									1
Driver Not signalling when turning	-.165**	-0.027	-0.055	0.028	-.125**	0.029	-0.054	-0.025	.090*
	.000	0.504	0.178	0.503	0.002	0.487	0.187	0.535	0.028

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table C18 Test of significance levels for within-subjects comparisons in ANOVAs conducted separately for each Situation. Cyclist and driver Swerving

Source	Configuration	Type III Sum of Squares	df	Mean Square	F	Sig.
Configuration	Linear	0.021	1	0.021	0.042	0.838
Configuration * Overconfidence	Linear	2.323	1	2.323	4.683	0.031
Configuration * Control	Linear	0.426	1	0.426	0.858	0.355
Configuration * Incompetence	Linear	0.001	1	0.001	0.001	0.970
Configuration * weekly time	Linear	5.584	1	5.584	11.256	0.001
Configuration * Violation	Linear	2.176	1	2.176	4.387	0.037
Configuration * Monthly use	Linear	1.709	1	1.709	3.446	0.064
Configuration * Age group	Linear	4.806	5	0.961	1.938	0.086
Configuration * Driver Cyclist	Linear	0.849	1	0.849	1.711	0.191
Configuration * gender	Linear	0.464	1	0.464	0.935	0.334
Configuration * Age group * Driver Cyclist	Linear	4.457	5	0.891	1.797	0.112
Configuration * Age group * gender	Linear	1.367	5	0.273	0.551	0.737
Configuration * Driver Cyclist * gender	Linear	0.758	1	0.758	1.527	0.217
Configuration * Age group * Driver Cyclist * gender	Linear	3.178	5	0.636	1.281	0.270
Error(Configuration)	Linear	279.784	564	0.496		

Table C19 Correlations – cyclist Swerving

Descriptive Statistics	Mean	Std. Deviation
Cyclist or driver	1.25	0.436
Age group	4.09	1.229
Gender	1.61	0.489
Weekly time	3.68	1.069
Monthly use	5.44	1.555
Violation	1.635	0.41829
Control	3.72	0.577
Overconfidence	3.66	0.616
Incompetence	2.02	0.509
Cyclist Swerving	2.8538	1.15198

Correla-tions	Cyclist or driver	Age group	Gender	Weekly time	Month-ly use	Viola-tion	Control	Over-confid-ence	Incom-pet-ence
Cyclist or driver	1	.095*	-.279**	-.193**	.311**	-0.041	-.123**	-.220**	.200**
		0.020	.000	.000	.000	0.324	0.003	.000	.000
Age group		1	0.043	0.065	0.008	-.134**	-0.01	-0.044	0.025
			0.296	0.111	0.846	0.001	0.812	0.282	0.551
Gender			1	.167**	0.038	.096*	.183**	.238**	-.190**
				.000	0.352	0.019	.000	.000	.000
Weekly time				1	.219**	-0.024	.228**	.260**	-.133**
					.000	0.565	.000	.000	0.001
Monthly use					1	.110**	0.063	.111**	-0.041
						0.007	0.123	0.007	0.32
Violation						1	-.120**	-0.061	.307**
							0.003	0.140	.000
Control							1	.669**	-.361**
								.000	.000
Over confidence								1	-.380**
									.000
Incomp-etence									1
Cyclist Swerving	.299**	0.056	-.180**	-.083*	0.06	.000	-.153**	-.186**	.207**
	.000	0.174	.000	0.044	0.145	0.994	.000	.000	.000

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table C20 Correlations – driver Swerving

Descriptive Statistics	Mean	Std. Deviation
Cyclist or driver	1.25	0.436
Age group	4.09	1.229
Gender	1.61	0.489
Weekly time	3.68	1.069
Monthly use	5.44	1.555
Violation	1.635	0.41829
Control	3.72	0.577
Overconfidence	3.66	0.616
Incompetence	2.02	0.509
Driver Swerving	3.4874	1.11211

Correlations	Cyclist or driver	Age group	Gender	Weekly time	Month-ly use	Viola-tion	Control	Over-confid-ence	Incomp -etence
Cyclist or driver	1	.095*	-.279**	-.193**	.311**	-0.041	-.123**	-.220**	.200**
		0.020	.000	.000	.000	0.324	0.003	.000	.000
Age group		1	0.043	0.065	0.008	-.134**	-0.01	-0.044	0.025
			0.296	0.111	0.846	0.001	0.812	0.282	0.551
Gender			1	.167**	0.038	.096*	.183**	.238**	-.190**
				.000	0.352	0.019	.000	.000	.000
Weekly time				1	.219**	-0.024	.228**	.260**	-.133**
					.000	0.565	.000	.000	0.001
Monthly use					1	.110**	0.063	.111**	-0.041
						0.007	0.123	0.007	0.32
Violation						1	-.120**	-0.061	.307**
							0.003	0.14	.000
Control							1	.669**	-.361**
								.000	.000
Over confidence								1	-.380**
									.000
Incompet-ence									1
Driver Swerving	0.04	-0.008	-.110**	.096*	-0.043	-0.075	-0.069	-0.032	.105*
	0.334	0.850	0.007	0.019	0.301	0.066	0.092	0.442	0.010

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table C21 Test of significance levels for within-subjects comparisons in ANOVAs conducted separately for each Situation. Cyclist and driver Tailgating

Source	Configuration	Type III Sum of Squares	df	Mean Square	F	Sig.
Configuration	Linear	0.779	1	0.779	2.161	0.142
Configuration * Overconfidence	Linear	1.612	1	1.612	4.475	0.035
Configuration * Control	Linear	0	1	0	0.001	0.976
Configuration * Incompetence	Linear	0.018	1	0.018	0.049	0.826
Configuration * Weekly time	Linear	0.093	1	0.093	0.259	0.611
Configuration * Violation	Linear	0.115	1	0.115	0.319	0.572
Configuration * Monthly use	Linear	0.02	1	0.02	0.057	0.812
Configuration * Age group	Linear	2.637	5	0.527	1.464	0.200
Configuration * Driver Cyclist	Linear	0.03	1	0.03	0.084	0.772
Configuration * gender	Linear	0.197	1	0.197	0.546	0.460
Configuration * Age group * Driver Cyclist	Linear	0.755	5	0.151	0.419	0.836
Configuration * Age group * gender	Linear	0.371	5	0.074	0.206	0.960
Configuration * Driver Cyclist * gender	Linear	0.409	1	0.409	1.136	0.287
Configuration * Age group * Driver Cyclist * gender	Linear	1.199	5	0.24	0.666	0.650
Error (Configuration)	Linear	203.216	564	0.36		

Table C22 Correlations – cyclist Tailgating

Descriptive Statistics	Mean	Std. Deviation
Cyclist or driver	1.25	0.436
Age group	4.09	1.229
Gender	1.61	0.489
Weekly time	3.68	1.069
Monthly use	5.44	1.555
Violation	1.635	0.41829
Control	3.72	0.577
Overconfidence	3.66	0.616
Incompetence	2.02	0.509
Cyclist Tailgating	3.5899	1.00833

Correlations	Cyclist or driver	Age group	Gender	Week-ly time	Month-ly use	Viola-tion	Cont-rol	Over-confid-ence	Incom-petence
Cyclist or driver	1	.095*	-.279**	-.193**	.311**	-0.041	-.123**	-.220**	.200**
		0.020	.000	.000	.000	0.324	0.003	.000	.000
Age group		1	0.043	0.065	0.008	-.134**	-0.01	-0.044	0.025
			0.296	0.111	0.846	0.001	0.812	0.282	0.551
Gender			1	.167**	0.038	.096*	.183**	.238**	-.190**
				.000	0.352	0.019	.000	.000	.000
Weekly time				1	.219**	-0.024	.228**	.260**	-.133**
					.000	0.565	.000	.000	0.001
Monthly use					1	.110**	0.063	.111**	-0.041
						0.007	0.123	0.007	0.320
Violation scale						1	-.120**	-0.061	.307**
							0.003	0.140	1.50
Control							1	.669**	-.361**
								.000	.000
Overconfidence								1	-.380**
									.000
Incompetence									1
Cyclist Tailgating	.099*	-0.046	-.179**	0.001	-0.019	-0.063	-.110**	-0.072	.106**
	0.015	0.263	.000	0.973	0.643	0.122	0.007	0.077	0.010

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Table C23 Correlations – driver Tailgating

	Mean	Std. Deviation
Cyclist or driver	1.25	0.436
Age group	4.09	1.229
Gender	1.61	0.489
Weekly time	3.68	1.069
Monthly use	5.44	1.555
Violation	1.635	0.41829
Control	3.72	0.577
Overconfidence	3.66	0.616
Incompetence	2.02	0.509
Driver Tailgating	3.9832	1.0149

Correlations	Cyclist or driver	Age group	Gender	Weekly time	Monthly use	Viola-tion	Control	Over-confidence	Incompetence
Cyclist or driver	1	.095*	-.279**	-.193**	.311**	-0.041	-.123**	-.220**	.200**
		0.020	.000	.000	.000	0.324	0.003	.000	.000
Age group		1	0.043	0.065	0.008	-.134**	-0.01	-0.044	0.025
			0.296	0.111	0.846	0.001	0.812	0.282	0.551
Gender			1	.167**	0.038	.096*	.183**	.238**	-.190**
				.000	0.352	0.019	.000	.000	.000
Weekly time				1	.219**	-0.024	.228**	.260**	-.133**
					.000	0.565	.000	.000	0.001
Monthly use					1	.110**	0.063	.111**	-0.041
						0.007	0.123	0.007	0.32
Violation						1	-.120**	-0.061	.307**
							0.003	0.14	.000
Control							1	.669**	-.361**
								.000	.000
Over confidence								1	-.380**
									.000
Incompetence									1
Driver Tailgating	0.04	-.115**	-.149**	0.056	.000	-0.035	-0.034	0.046	
	0.328	0.005	.000	0.175	0.991	0.395	0.402	0.259	

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table C24 Test of significance levels for within-subjects comparisons in ANOVAs conducted separately for each Situation. Cyclist and driver Not checking traffic

Source	Configuration	Type III Sum of Squares	df	Mean Square	F	Sig.
Configuration	Linear	0.006	1	0.006	0.018	0.893
Configuration * Overconfidence	Linear	0.929	1	0.929	2.956	0.086
Configuration * Control	Linear	0.121	1	0.121	0.386	0.534
Configuration * Incompetence	Linear	0.088	1	0.088	0.279	0.598
Configuration * Weekly time	Linear	0.065	1	0.065	0.206	0.65
Configuration * Violation	Linear	0.089	1	0.089	0.284	0.594
Configuration * Monthly	Linear	0.252	1	0.252	0.803	0.371
Configuration * Age groups	Linear	1.099	5	0.22	0.699	0.624
Configuration * Driver Cyclist	Linear	1.466	1	1.466	4.664	0.031
Configuration * gender	Linear	0.316	1	0.316	1.007	0.316
Configuration * Age group * Driver Cyclist	Linear	1.966	5	0.393	1.251	0.284
Configuration * Age group * gender	Linear	0.896	5	0.179	0.57	0.723
Configuration * Driver Cyclist * gender	Linear	0.188	1	0.188	0.6	0.439
Configuration * Agegroup * Driver Cyclist * gender	Linear	1.182	5	0.236	0.753	0.584
Error(Configuration)	Linear	177.211	564	0.314		

Table C25 Correlations – cyclist Not checking traffic

Descriptive Statistics	Mean	Std. Deviation
Cyclist or driver	1.25	0.436
Age group	4.09	1.229
Gender	1.61	0.489
Time spent riding or driving each week, v63,133	3.68	1.069
Frequency of use total participants	5.44	1.555
Violation scale	1.635	0.41829
Control	3.72	0.577
Overconfidence	3.66	0.616
Incompetence	2.02	0.509
Cyclist Not checking traffic	3.2588	1.17504

Correlations	Cyclist or driver	Age group	Gender	Weekly time	Month-ly use	Viola-tion	Control	Over-confid-ence	Incomp etence
Cyclist or driver	1	.095*	-.279**	-.193**	.311**	-0.041	-.123**	-.220**	.200**
		.000	.000	.000	0.324	0.003	.000	.000	.000
Age group		1	0.043	0.065	0.008	-.134**	-0.01	-0.044	0.025
			0.296	0.111	0.846	0.001	0.812	0.282	0.551
Gender			1	.167**	0.038	.096*	.183**	.238**	-.190**
				.000	0.352	0.019	.000	.000	.000
Weekly time				1	.219**	-0.024	.228**	.260**	-.133**
					.000	0.565	.000	.000	0.001
Monthly use					1	.110**	0.063	.111**	-0.041
						0.007	0.123	0.007	0.320
Violation scale						1	-.120**	-0.061	.307**
							0.003	0.140	.000
Control							1	.669**	-.361**
								.000	.000
Overconfidence								1	-.380**
									.000
Incompetence									1
Cyclist Not checking traffic	.210**	-0.064	-.211**	-.082*	-0.033	-0.04	-.153**	-.131**	
	.000	0.118	.000	0.045	0.415	0.332	.000	0.001	

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table C26 Correlations – driver Not checking traffic

Descriptive Statistics	Mean	Std. Deviation
Cyclist or driver	1.25	0.436
Age group	4.09	1.229
Gender	1.61	0.489
Weekly time	3.68	1.069
Monthly use	5.44	1.555
Violation scale	1.635	0.41829
Control	3.72	0.577
Overconfidence	3.66	0.616
Incompetence	2.02	0.509
Driver Not checking traffic	3.6908	1.24255

Correlations	Cyclist or driver	Age group	Gender	Weekly time	Monthly use	Viola-tion	Control	Overcon -fidence	Incompe tence
Cyclist or driver	1	.095*	-.279**	-.193**	.311**	-0.041	-.123**	-.220**	.200**
		0.02	0	0	0	0.324	0.003	0	.000
Age group		1	0.043	0.065	0.008	-.134**	-0.01	-0.044	0.025
			0.296	0.111	0.846	0.001	0.812	0.282	0.551
Gender			1	.167**	0.038	.096*	.183**	.238**	-.190**
				0	0.352	0.019	0	0	.000
Weekly time				1	.219**	-0.024	.228**	.260**	-.133**
					0	0.565	0	0	0.001
Monthly use					1	.110**	0.063	.111**	-0.041
						0.007	0.123	0.007	0.320
Violation scale						1	-.120**	-0.061	.307**
							0.003	0.14	.000
Control							1	.669**	-.361**
								0	.000
Overconfidence								1	-.380**
									.000
Incompetence									1
Driver Not checking traffic	0.043	-0.068	-.196**	-0.029	-.089*	-0.035	-.108**	-0.052	
	0.299	0.1	0	0.475	0.03	0.401	0.009	0.207	

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table C27 Descriptive

Descriptive		N	Mean	Std. Deviation	Std. Error	
					Lower Bound	Upper Bound
Cyclist Failing to yield	Cyclist	444	2.3829	1.11516	0.05292	2.2789
	Driver	151	3.0397	1.13067	0.09201	2.8579
	Total	595	2.5496	1.15418	0.04732	2.4567
Driver Failing to yield	Cyclist	444	3.8514	1.00584	0.04774	3.7575
	Driver	151	3.0993	1.12401	0.09147	2.9186
	Total	595	3.6605	1.08667	0.04455	3.573
Cyclist Going through a red light	Cyclist	444	2.714	1.18557	0.05626	2.6034
	Driver	151	3.3709	1.11723	0.09092	3.1912
	Total	595	2.8807	1.20222	0.04929	2.7839
Driver Going through a red light	Cyclist	444	3.9122	1.16918	0.05549	3.8031
	Driver	151	3.7086	1.08068	0.08794	3.5348
	Total	595	3.8605	1.1499	0.04714	3.7679
Cyclist Not signalling when turning	Cyclist	444	2.5743	1.03281	0.04902	2.478
	Driver	151	2.8477	1.10603	0.09001	2.6698
	Total	595	2.6437	1.05765	0.04336	2.5585
Driver Not signalling when turning	Cyclist	444	3.4257	1.05658	0.05014	3.3271
	Driver	151	3.0199	1.04862	0.08534	2.8513
	Total	595	3.3227	1.0684	0.0438	3.2367
Cyclist Swerving	Cyclist	444	2.6532	1.08612	0.05154	2.5519
	Driver	151	3.4437	1.14097	0.09285	3.2602
	Total	595	2.8538	1.15198	0.04723	2.761
Driver Swerving	Cyclist	444	3.4617	1.13068	0.05366	3.3563
	Driver	151	3.5629	1.05563	0.08591	3.3932
	Total	595	3.4874	1.11211	0.04559	3.3979
Cyclist Tailgating	Cyclist	444	3.5315	1.00176	0.04754	3.4381
	Driver	151	3.7616	1.01133	0.0823	3.599
	Total	595	3.5899	1.00833	0.04134	3.5087
Driver Tailgating	Cyclist	444	3.9595	1.05521	0.05008	3.861
	Driver	151	4.053	0.88535	0.07205	3.9106
	Total	595	3.9832	1.0149	0.04161	3.9015
Cyclist Not checking traffic	Cyclist	444	3.1149	1.14338	0.05426	3.0082
	Driver	151	3.6821	1.16831	0.09508	3.4943
	Total	595	3.2588	1.17504	0.04817	3.1642
Driver Not checking traffic	Cyclist	444	3.6599	1.27985	0.06074	3.5405
	Driver	151	3.7815	1.12484	0.09154	3.6006
	Total	595	3.6908	1.24255	0.05094	3.5907

Table C28 Levene Statistic Test of Homogeneity of Variances

Test of Homogeneity of Variances	Levene Statistic	df1	df2	Sig.
Cyclist Failing to yield	0.276	1	593	0.6
Driver Failing to yield	12.056	1	593	0.001
Cyclist Going through a red light	2.065	1	593	0.151
Driver Going through a red light	0.822	1	593	0.365
Cyclist Not signalling when turning	1.727	1	593	0.189
Driver Not signalling when turning	0.264	1	593	0.608
Cyclist Swerving	0.063	1	593	0.802
Driver Swerving	2.441	1	593	0.119
Cyclist Tailgating	0.633	1	593	0.427
Driver Tailgating	7.304	1	593	0.007
Cyclist Not checking traffic	0.017	1	593	0.897
Driver Not checking traffic	7.38	1	593	0.007

ANOVA		Sum of Squares	df	Mean Square	F
Cyclist Failing to yield	Between Groups	48.616	1	48.616	38.818
	Within Groups	742.671	593	1.252	
	Total	791.287	594		
Driver Failing to yield	Between Groups	63.723	1	63.723	59.256
	Within Groups	637.699	593	1.075	
	Total	701.422	594		
Cyclist Going through a red light	Between Groups	48.623	1	48.623	35.601
	Within Groups	809.905	593	1.366	
	Total	858.528	594		
Driver Going through a red light	Between Groups	4.669	1	4.669	3.546
	Within Groups	780.753	593	1.317	
	Total	785.422	594		
Cyclist Not signalling when turning	Between Groups	8.42	1	8.42	7.611
	Within Groups	656.044	593	1.106	
	Total	664.464	594		
Driver Not signalling when turning	Between Groups	18.556	1	18.556	16.685
	Within Groups	659.488	593	1.112	
	Total	678.044	594		
Cyclist Swerving	Between Groups	70.422	1	70.422	58.173
	Within Groups	717.857	593	1.211	
	Total	788.279	594		
Driver Swerving	Between Groups	1.154	1	1.154	0.933

	Within Groups	733.501	593	1.237	
	Total	734.655	594		
Cyclist Tailgating	Between Groups	5.964	1	5.964	5.914
	Within Groups	597.976	593	1.008	
	Total	603.939	594		
Driver Tailgating	Between Groups	0.986	1	0.986	0.957
	Within Groups	610.846	593	1.03	
	Total	611.832	594		
Cyclist Not checking traffic	Between Groups	36.258	1	36.258	27.428
	Within Groups	783.884	593	1.322	
	Total	820.141	594		
Driver Not checking traffic	Between Groups	1.665	1	1.665	1.078
	Within Groups	915.434	593	1.544	
	Total	917.099	594		

Within-Subjects Factors
Measure: MEASURE_1

Configuration		Dependent Variable
	1	v1
	2	v2

Between-Subjects Factors		Value Label	N
Age group	2	20 - 29	69
	3	30 - 39	128
	4	40 - 49	156
	5	50 - 59	175
	6	60 - 69	56
	7	70 -79	11
Cyclist or driver	1	Cyclist	444
	2	Driver	151
Gender	1	female	235
	2	male	360

Table C29 Multivariate Tests

Effect		Value	F	Hypothesis df	Error df
Configuration	Pillai's Trace	0.012	7.064b	1	568
	Wilks' Lambda	0.988	7.064b	1	568
	Hotelling's Trace	0.012	7.064b	1	568
	Roy's Largest Root	0.012	7.064b	1	568
Configuration * Overconfidence	Pillai's Trace	0.008	4.702b	1	568
	Wilks' Lambda	0.992	4.702b	1	568
	Hotelling's Trace	0.008	4.702b	1	568
	Roy's Largest Root	0.008	4.702b	1	568
Configuration * Control	Pillai's Trace	0.003	1.662b	1	568
	Wilks' Lambda	0.997	1.662b	1	568
	Hotelling's Trace	0.003	1.662b	1	568
	Roy's Largest Root	0.003	1.662b	1	568
Configuration * Incompetence	Pillai's Trace	0.02	11.784b	1	568
	Wilks' Lambda	0.98	11.784b	1	568
	Hotelling's Trace	0.021	11.784b	1	568
	Roy's Largest Root	0.021	11.784b	1	568
Configuration * Age group	Pillai's Trace	0.012	1.340b	5	568
	Wilks' Lambda	0.988	1.340b	5	568
	Hotelling's Trace	0.012	1.340b	5	568
	Roy's Largest Root	0.012	1.340b	5	568
Configuration * Driver Cyclist	Pillai's Trace	0.093	58.412b	1	568
	Wilks' Lambda	0.907	58.412b	1	568
	Hotelling's Trace	0.103	58.412b	1	568
	Roy's Largest Root	0.103	58.412b	1	568
Configuration * Gender	Pillai's Trace	0.002	1.404b	1	568
	Wilks' Lambda	0.998	1.404b	1	568
	Hotelling's Trace	0.002	1.404b	1	568
	Roy's Largest Root	0.002	1.404b	1	568
Configuration * Age group * Driver Cyclist	Pillai's Trace	0.002	.234b	5	568
	Wilks' Lambda	0.998	.234b	5	568
	Hotelling's Trace	0.002	.234b	5	568
	Roy's Largest Root	0.002	.234b	5	568
Configuration * Age group * Gender	Pillai's Trace	0.004	.419b	5	568
	Wilks' Lambda	0.996	.419b	5	568
	Hotelling's Trace	0.004	.419b	5	568
	Roy's Largest Root	0.004	.419b	5	568
Configuration * Driver Cyclist * Gender	Pillai's Trace	0.001	.831b	1	568
	Wilks' Lambda	0.999	.831b	1	568
	Hotelling's Trace	0.001	.831b	1	568
	Roy's Largest Root	0.001	.831b	1	568
Configuration * Age group * Driver Cyclist * Gender	Pillai's Trace	0.006	.717b	5	568
	Wilks' Lambda	0.994	.717b	5	568
	Hotelling's Trace	0.006	.717b	5	568
	Roy's Largest Root	0.006	.717b	5	568

a Design: Intercept + Overconfidence+ Control + Incompetence + Agegroup + Driver Cyclist + Gender + Agegroup * Driver Cyclist + Agegroup * Gender + Driver Cyclist * Gender + Agegroup * Driver Cyclist * Gender

Within Subjects Design: Configuration

b Exact statistic
Mauchly's Test of Sphericitya
Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilonb Greenhouse-Geisser	Huynh-Feldt
Configuration	1	0	0	.	1	1

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.
a Design: Intercept + Overconfidence + Control + Incompetence+ Age group + Driver Cyclist + Gender + Age group * Driver Cyclist + Age group * Gender+ Driver Cyclist * Gender+ Age group * Driver Cyclist * Gender

Within Subjects Design: Configuration
b May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source	Tests of Within-Subjects Effects	Type III Sum of Squares	df	Mean Square	F	Sig.
Configuration	Measure: MEASURE_1	4.163	1	4.163	7.064	0.008
	Greenhouse-Geisser	4.163	1	4.163	7.064	0.008
	Huynh-Feldt	4.163	1	4.163	7.064	0.008
	Lower-bound	4.163	1	4.163	7.064	0.008
Configuration * Overconfidence	Sphericity Assumed	2.771	1	2.771	4.702	0.031
	Greenhouse-Geisser	2.771	1	2.771	4.702	0.031
	Huynh-Feldt	2.771	1	2.771	4.702	0.031
	Lower-bound	2.771	1	2.771	4.702	0.031
Configuration * Control	Sphericity Assumed	0.979	1	0.979	1.662	0.198
	Greenhouse-Geisser	0.979	1	0.979	1.662	0.198
	Huynh-Feldt	0.979	1	0.979	1.662	0.198
	Lower-bound	0.979	1	0.979	1.662	0.198
Configuration * Incompetence	Sphericity Assumed	6.945	1	6.945	11.784	0.001
	Greenhouse-Geisser	6.945	1	6.945	11.784	0.001
	Huynh-Feldt	6.945	1	6.945	11.784	0.001
	Lower-bound	6.945	1	6.945	11.784	0.001
Configuration * Age group	Sphericity Assumed	3.948	5	0.79	1.34	0.246
	Greenhouse-Geisser	3.948	5	0.79	1.34	0.246
	Huynh-Feldt	3.948	5	0.79	1.34	0.246
	Lower-bound	3.948	5	0.79	1.34	0.246
Configuration * Driver Cyclist	Sphericity Assumed	34.428	1	34.428	58.412	.000
	Greenhouse-Geyser	34.428	1	34.428	58.412	.000
	Huynh-Felt	34.428	1	34.428	58.412	.000
	Lower-bound	34.428	1	34.428	58.412	.000
Configuration * gender	Sphericity Assumed	0.828	1	0.828	1.404	0.236
	Greenhouse-Geisser	0.828	1	0.828	1.404	0.236

	Huynh-Feldt	0.828	1	0.828	1.404	0.236
	Lower-bound	0.828	1	0.828	1.404	0.236
Configuration * Age group * Driver Cyclist	Sphericity Assumed	0.69	5	0.138	0.234	0.947
	Greenhouse-Geisser	0.69	5	0.138	0.234	0.947
	Huynh-Feldt	0.69	5	0.138	0.234	0.947
	Lower-bound	0.69	5	0.138	0.234	0.947
Configuration * Age group * Gender	Sphericity Assumed	1.236	5	0.247	0.419	0.835
	Greenhouse-Geisser	1.236	5	0.247	0.419	0.835
	Huynh-Feldt	1.236	5	0.247	0.419	0.835
	Lower-bound	1.236	5	0.247	0.419	0.835
Configuration * Driver Cyclist * Gender	Sphericity Assumed	0.49	1	0.49	0.831	0.362
	Greenhouse-Geisser	0.49	1	0.49	0.831	0.362
	Huynh-Feldt	0.49	1	0.49	0.831	0.362
	Lower-bound	0.49	1	0.49	0.831	0.362
Configuration * Age group * Driver Cyclist * Gender	Sphericity Assumed	2.113	5	0.423	0.717	0.611
	Greenhouse-Geisser	2.113	5	0.423	0.717	0.611
	Huynh-Feldt	2.113	5	0.423	0.717	0.611
	Lower-bound	2.113	5	0.423	0.717	0.611
Error(Configuration)	Sphericity Assumed	334.776	568	0.589		
	Greenhouse-Geisser	334.776	568	0.589		
	Huynh-Feldt	334.776	568	0.589		
	Lower-bound	334.776	568	0.589		

Table C30 Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Configuration	Type III Sum of Squares	df	Mean Square	F	Sig.
Configuration	Linear	4.163	1	4.163	7.064	0.008
Configuration * Overconfidence	Linear	2.771	1	2.771	4.702	0.031
Configuration * Control	Linear	0.979	1	0.979	1.662	0.198
Configuration * Incompetence	Linear	6.945	1	6.945	11.784	0.001
Configuration * Age group	Linear	3.948	5	0.79	1.34	0.246
Configuration * Driver Cyclist	Linear	34.428	1	34.428	58.412	0
Configuration * Gender	Linear	0.828	1	0.828	1.404	0.236
Configuration * Age group * Driver Cyclist	Linear	0.69	5	0.138	0.234	0.947
Configuration * Age group * Gender	Linear	1.236	5	0.247	0.419	0.835
Configuration * Driver Cyclist * Gender	Linear	0.49	1	0.49	0.831	0.362
Configuration * Age group * Driver Cyclist * Gender	Linear	2.113	5	0.423	0.717	0.611
Error(Configuration)	Linear	334.776	568	0.589		

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	100.307	1	100.307	60.743	0
Overconfidence	1.827	1	1.827	1.107	0.293
Control	9.677	1	9.677	5.86	0.016
Incompetence	11.043	1	11.043	6.687	0.01
Age groups	16.52	5	3.304	2.001	0.077
Driver Cyclist	0.389	1	0.389	0.236	0.628
Gender	1.134	1	1.134	0.686	0.408
Age group * Drive r Cyclist	16.222	5	3.244	1.965	0.082
Age group * Gender	12.477	5	2.495	1.511	0.184
Drive r Cyclist * Gender	0.01	1	0.01	0.006	0.938
Age group * Driver Cyclist * Gender	7.491	5	1.498	0.907	0.476
Error	937.962	568	1.651		

Table C31 Tests of Between-Subjects Effects, Fail to yield

Tests of Between-Subjects Effects
Measure:
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	105.142	1	105.142	64.754	0.000
Overconfidence	2.381	1	2.381	1.466	0.226
Control	12.775	1	12.775	7.868	0.005
Incompetence	16.937	1	16.937	10.431	0.001
Time spent per week	7.293	1	7.293	4.491	0.035
Violation self-reported	9.89	1	9.89	6.091	0.014
Monthly use	4.964	1	4.964	3.057	0.081
Age groups	16.213	5	3.243	1.997	0.077
Driver Cyclist	0.03	1	0.03	0.019	0.892
Gender	1.091	1	1.091	0.672	0.413
Age group * Driver Cyclist	18.492	5	3.698	2.278	0.046
Age group * gender	11.414	5	2.283	1.406	0.220
Driver Cyclist * gender	0.229	1	0.229	0.141	0.707
Age group * Driver Cyclist * gender	7.192	5	1.438	0.886	0.490
Error	915.767	564	1.624		

Table C32 Tests of Between-Subjects Effects, Going through a red light

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	71.226	1	71.226	38.363	0
Overconfidence	8.458	1	8.458	4.556	0.033
Control	5.036	1	5.036	2.712	0.100
Incompetence	17.175	1	17.175	9.25	0.002
Time spent per week	6.171	1	6.171	3.324	0.069
Violation self-reported	8.586	1	8.586	4.625	0.032
Monthly use	1.04	1	1.04	0.56	0.455
Age groups	34.176	5	6.835	3.682	0.003
Driver Cyclist	10.21	1	10.21	5.5	0.019
Gender	4.659	1	4.659	2.509	0.114
Age groups * Driver Cyclist	8.598	5	1.72	0.926	0.463
Age groups * gender	13.855	5	2.771	1.493	0.190
Driver Cyclist * gender	0.631	1	0.631	0.34	0.560
Age groups * Driver Cyclist * gender	8	5	1.6	0.862	0.507
Error	1047.128	564	1.857		

Table C33 Tests of Between-Subjects Effects, Not signalling when turning

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	87.535	1	87.535	55.971	0
Overconfidence	0.013	1	0.013	0.008	0.928
Control	2.029	1	2.029	1.297	0.255
Incompetence	14.457	1	14.457	9.244	0.002
Time spent per week	2.395	1	2.395	1.531	0.216
Violation self-reported	0.75	1	0.75	0.48	0.489
Monthly use	7.218	1	7.218	4.615	0.032
Age group	3.275	5	0.655	0.419	0.836
Driver Cyclist	0.931	1	0.931	0.595	0.441
Gender	13.191	1	13.191	8.435	0.004
Age group * Driver Cyclist	11.102	5	2.22	1.42	0.215
Age group * gender	4.319	5	0.864	0.552	0.737
Driver Cyclist * gender	1.528	1	1.528	0.977	0.323
Age group * Driver Cyclist * gender	7.015	5	1.403	0.897	0.483
Error	882.059	564	1.564		

Table C34 Tests of Between-Subjects Effects, Swerving

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	96.299	1	96.299	51.072	0
Overconfidence total	0.135	1	0.135	0.071	0.789
Control perceived skill	3.2	1	3.2	1.697	0.193
Incompetence	14.908	1	14.908	7.907	0.005
Time spent per week	8.079	1	8.079	4.285	0.039
Violation	5.134	1	5.134	2.723	0.099
Frequency use total	1.802	1	1.802	0.956	0.329
Age group	5.796	5	1.159	0.615	0.689
Driver Cyclist	17.888	1	17.888	9.487	0.002
Gender Cyclist Driver	7.174	1	7.174	3.805	0.052
Age group * Driver Cyclist	5.608	5	1.122	0.595	0.704
Age group * gender Cyclist Driver	9.162	5	1.832	0.972	0.434
Driver Cyclist * gender Cyclist Driver	0.11	1	0.11	0.058	0.809
Age group * Driver Cyclist * gender Cyclist Driver	4.215	5	0.843	0.447	0.815
Error	1063.438	564	1.886		

Table C35 Tests of Between-Subjects Effects, Tailgating

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	114.921	1	114.921	72.829	0.000
Overconfidence	10.655	1	10.655	6.752	0.010
Control	7.93	1	7.93	5.025	0.025
Incompetence	7.301	1	7.301	4.627	0.032
Time spent per week	6.297	1	6.297	3.991	0.046
Violation self-reported	6.368	1	6.368	4.036	0.045
Monthly use	1.262	1	1.262	0.799	0.372
Age group	17.794	5	3.559	2.255	0.048
Driver Cyclist	13.17	1	13.17	8.346	0.004
Gender	6.878	1	6.878	4.359	0.037
Age group * Driver Cyclist	16.406	5	3.281	2.079	0.066
Age group * gender	5.485	5	1.097	0.695	0.627
Drive Cyclist * gender	0.384	1	0.384	0.243	0.622
Age group * Driver Cyclist * gender	7.123	5	1.425	0.903	0.479
Error	889.971	564	1.578		

Table C36 Tests of Between-Subjects Effects, Not checking traffic

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	138.443	1	138.443	57.451	0.000
Overconfidence	5.854	1	5.854	2.429	0.120
Control	13.32	1	13.32	5.527	0.019
Incompetence	11.559	1	11.559	4.797	0.029
Time spent per week	1.194	1	1.194	0.495	0.482
Violation self-reported	4.518	1	4.518	1.875	0.171
Monthly use	11.586	1	11.586	4.808	0.029
Age group	30.44	5	6.088	2.526	0.028
Driver Cyclist	11.184	1	11.184	4.641	0.032
Gender	4.622	1	4.622	1.918	0.167
Age group * Driver Cyclist	7.728	5	1.546	0.641	0.668
Age group * gender	9.303	5	1.861	0.772	0.570
Driver Cyclist * gender	0.061	1	0.061	0.025	0.874
Age group * Driver Cyclist * gender	10.048	5	2.01	0.834	0.526
Error	1359.106	564	2.41		